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ALIEN PROPERTY CUSTODIAN

METHOD FOR REPAIRING ROLL PASSES

Simon Hellmanns, Dortmund-Berghofen, Germany; vested in the Alien Property Custodian

Application filed December 11, 1939

Rolls, which have to work in every rolling period comparatively large quantities, such as cogging rolls, head rolls in general and the like, evidently show a very strong wear in the corresponding passes which are used again and again. At the repairing of the rolls it is possible to obtain always again the desired pass shape on the base of the pass, but this is not possible on the side faces, as just at these points the wear is very great. On these side faces only simple smoothing is possible. The result hereof is, that the pass width enlarges each time and the rolls must very often be put out of service, although as regards the diameter they still ought to be suitable for use. An orderly and therefore economical working is, however, with these rollers with too wide pass width, no longer possible for the reason that, owing to this too wide pass width, the reduction in the next following pass, be it on the same or on another housing or on an other train of rolls, is too high and consequently leads to overloadings of the driving engine. Other inconveniences which may occur are decrease of the rolling speed, cutting out of the automatic protection, sticking fast of the material to be rolled between the rolls, fractures of the roll journals and even damaging of the driving engine. If then, in order to obtain the desired final cross-section, the total pass-number on the corresponding housing were increased, this would be very uneconomical, as then the longest last, that is the passes which are most stressed, would have to be passed through several times.

It has been proposed, in steel rolls, to bring the corresponding passes to the original width by electric moistening welding of the side faces. When using soft electrodes a high wear occurred evidently during the rolling. When electrodes of sufficient hardness and wear resistance were used, too many fissures showed during the treating of the moistened faces. Besides the transition points from the weld to the base material were so hard, that they could be worked only with great difficulty. Also the proceeding, to apply a hard wear-proof layer on to a tough and soft layer did not give the desired result, as the weld burrs were torn out of the connection and just on the side faces. The groove which is thereby formed increased very rapidly and this did lead again to surface defects on the rolled material.

According to the invention perfect repairing of strongly stressed passes is possible.

A pass, which has for instance to be made narrower by a certain measure, is turned on one side or on both sides. Two halves of the same ring of corresponding material and of corresponding cross-section are then inserted and the gaps closed with soft and tough electrodes.

Two different embodiments of the invention are illustrated in the accompanying drawing, in which

Fig. 1 shows the lower half of the pass, prior to the repairing, whereas the upper half shows the same pass after the repair. The portion designated by *b* is first turned. The ring halves *c* are then inserted and the wedge-shaped gap at *d* is closed by welding. The small grooves remaining on the joints of the two ring halves are carefully closed by welding. The inserted ring is turned smooth and an absolutely new pass is given to the same at which the material to be rolled does not come into contact with a welded-on surface. In this manner according to the invention it is also possible in rolls which in consideration of the high costs are made of non-alloyed steel, to subsequently insert pass rings of high grade wear-proof material and to thereby considerably lengthen the lastingness of these rolls.

Also cast iron rolls, in which a repairing of the pass walls was not possible at all up to the present, can be much better utilised by insertion of rings according to the invention. In this last instance instead of welding together the ring and the roll, another manner of fixation must be selected. This manner of fixation is illustrated in Fig. 2. A corresponding number of holes *a* is bored into the roll edges. The portion designated by *g* is then removed by turning, the bore holes being cut at the portion facing the pass. Suitably beveled bolts *e*, as shown in Fig. 3, are then inserted into these holes. The ring halves are then pushed on and welded the one with the other and with the bolt. With this kind of fixation the ring can expand without any hindrance. Notwithstanding the different expansion coefficients of cast iron and steel on the repaired pass point no prejudicial stresses occur, which might lead to tearing off of the ring.

SIMON HELLMANNNS.

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S. HELLMANN'S
METHOD FOR REPAIRING ROLL PASSES
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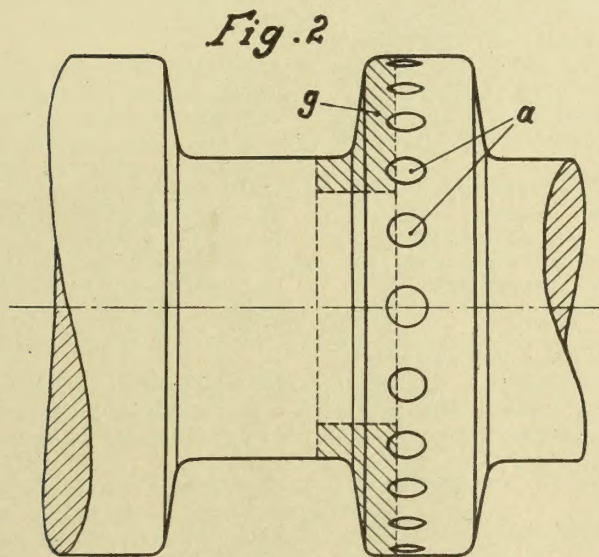
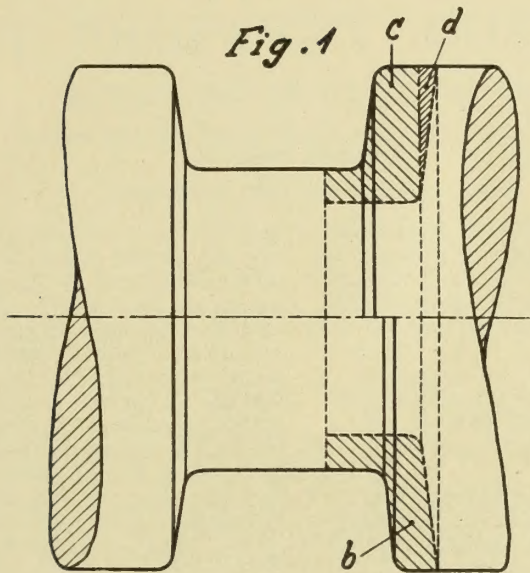
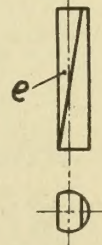
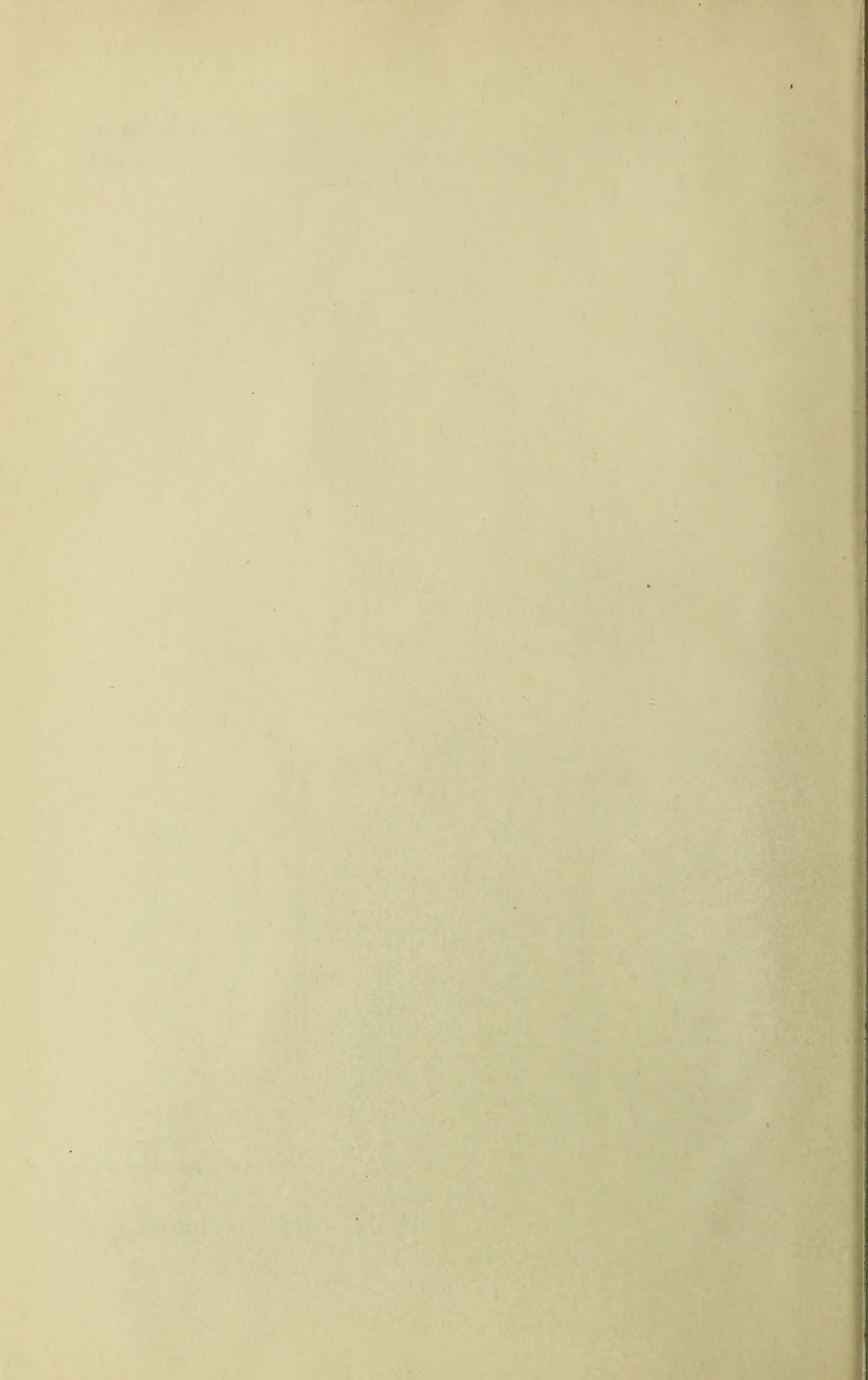


Fig. 3



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ALIEN PROPERTY CUSTODIAN

BOLT CLOSER FOR AUTOMATIC ARMS

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Property Custodian

Application filed December 12, 1939

The present invention relates to an improved bolt closer for automatic arms having the object of allowing the automatic functioning with much reduced pressures. The results are so far of mechanical nature as strains, frictions and consequent consumption of the moving parts are remarkably diminished; of ballistic nature when considering that the highest pressure of the firing gases is utilized for firing the projectile, which acquires the best efficiency in range, flatness of trajectory and force of penetration or perforation. Furthermore a balanced functioning is obtained with the remarkable reduction of the characteristic strain the automatic arms are subjected to, causing fatigue for the rifleman, straining for the material, dangerous dispersion of firing.

Fundamental characteristic is the lightness and the small obstructing volume of the parts composing the device resulting easily controllable in the right phase with a minimum absorption of energy.

The simple longitudinally sliding bolt may have a cylindrical, parallelepipedal or prismatic form.

According to the invention in the outside surface of the bolt there is provided a cavity destined to receive a blocking device comprising a lever or square plate provided with an adjoint piece shaped like a small ear. In correspondence of one of the two short sides, this plate is rounded in the point destined to bear on the breech or fixed part of the arm while in correspondence of the other short side there is a surface substantially plane as the said corresponding seat provided in the bolt.

When the bolt is at the end of the forward stroke bearing on the barrel in correspondence of the cartridge chamber, said plate by seating in said cavity blocks the bolt.

With the improved bolt closing device according to the invention the advantage is obtained that the action of the recoil displaces the mass comprising the barrel, the bolt, the striker, the movable breech solidarily for a pre-established extent. This tract is determined in relation to the power of the cartridge and the type of the arm. During this tract the bolt and movable breech to which the barrel is solidary, remain blocked. The arm advances in conditions of extreme security while the projectile receives the greatest thrust possible.

Once run said pre-established tract of solidary movement of said parts, a disengagement occurs between bolt and movable breech. This disengagement takes place by means of a device the structure of which according to the invention is

such as to allow that in very short time but with a certain progressiveness there takes place the displacement of the blocking member. Things are arranged in such a way that the lever arms of the playing parts allow to reach the aim mentioned.

In short, after the firing of the cartridge seven movements are determined as follows:

(1) A recoil movement with the movable parts solidary to each other through said blocking device.

(2) Prosecution of the recoil movement with engagement of the angle pawl of the blocking member with the fixed breech.

(3) Prosecution of the recoil movement with engagement of said pawl with the inferior ear of the blocking member and consequent disengagement of the bolt as regards the moveable breech, this breech being stopped.

(4) Prosecution of the retrocession of the bolt alone (with the relative striker) till the recoil stroke is completed.

(5) Solidary forward stroke of the bolt and striker under the action of the striker spring till the striker engages the stopping pawl of the firing device.

(6) Forward stroke of the bolt owing to inertia, the striker being unmoveable, held by said pawl and engagement of the blocking member into the corresponding seat provided in the bolt.

(7) Disengagement of the striker from the relative stopping mechanism and percussion of the bottom of the new cartridge automatically, in a known way, substituted to the preceding one in the apposite chamber.

The pawl of the blocking member shaped like an angle lever cooperates by means of one of its arms with an adjoint piece carried by the blocking member in the way further on explained better.

The invention is illustrated in the accompanying drawings in which:

Fig. 1 shows in partial longitudinal section a portable arm (rifle) with a cartridge in the apposite chamber, herein blocked by the bolt and with the striker cocked and ready for firing.

Fig. 2 shows the phase of the disengagement of the parts during the expulsion of the cartridge case.

Fig. 3 is a view similar to the preceding illustrating the position of the parts after firing and the expulsion of the case.

With reference to fig. 1 the barrel 1 of the rifle is screwed and solidarily connected to the moveable breech 2 solicited to remain in the posi-

tion illustrated in fig. 1 by the action of a spring illustrated in 20. Against the back end of the barrel 1 there bears the bolt 3 blocked in this position by the pawl 4 whose anterior end 5 is lodged in the seat 6 (fig. 2) provided in the outside surface of the bolt 3. Within the bolt 3 there is lodged the striker 7. This latter is actuated by the thrusting rod 8, which in a known way is sollicitated by a compressing spring situated in the butt of the arm (not illustrated).

The blocking pawl 4 ends posteriorly with a cylindrical surface in 9 bearing on the relative seat 10 fixed in the moveable breech 2 of the arm. The blocking member 4 may execute an angular movement from the position illustrated in fig. 1 to the position illustrated in the fig. 2. Inferiorly the blocking member 4 is provided with an adjoint piece 11 destined to cooperate with the upper arm 12 of the angle lever 12—13 fulcrumed in 14. In the block position illustrated in fig. 1 the angle lever 12—13 holds with the end of its arm 12 the blocking member 4 within the relative seat 6 bearing against the lower projection 15 of the pawl 4. The angle lever 12—13 is sollicitated to be carried to and remain in the position illustrated in fig. 1 by a spring 16.

At the firing instant the case 17 reacts against the bolt 3, solliciting the same to retrocede with the striker 7 contained therein, entraining first solidarily under the action of the blocking pawl 4 the moveable breech 2 and the barrel 1. These parts form in the whole a remarkable mass so that the retrocession of the case 17 is somewhat slow and the action of the explosion gases on the projectile causes a maximum effect giving to the projectile a speed neatly higher, the other conditions being the same, than that obtained with the usual automatic arms.

After a certain tract in the recoil movement has been run, the arm 13 of the lever 12—13 carried by the moveable breech 2 engages against the fixed stop 18 and begins a left-hand rotation against the action of the spring 16. The end of the arm 12 slides on the supporting surface of the said adjoint piece 15 of the pawl 4, then abandoning such a surface and penetrating into the notch 19 existing between the adjoint piece 15 mentioned and the adjoint piece 11 of the same pawl 4. While prosecuting the retrocession of the moveable breech, said lever 12—13 engages with its arm 12 against the upper surface of the piece 11 and lowers this latter together with the pawl 4 solidary thereto, causing an angular movement around the axis of the cylindrical surface 9. The lowering movement of the pawl 4 is progressive since the engagement between the arm 12 and the piece 11 begins between the root of the arm 12 and the end of the piece 11, the progressive displacement occurring as far as towards the end of the arm 12 and respectively the root of the piece 11.

When the blocking pawl 4 has completely abandoned the seat 6 provided in the outside surface of the bolt 3, this latter sollicitated by the reaction of the case 17, abandons the moveable breech 2 and retrocedes independently, together

with the striker 7 entirely compressing the relative spring by means of the rod 8. Meanwhile the moveable breech 2 (and the barrel 1 solidary thereto) has come back from the position illustrated in fig. 2 to the position illustrated in fig. 3 under the action of its own spring 20.

Starting from the position illustrated in fig. 3 the bolt 3 is pushed forward by the relative spring through the rod 8 and in such movement seizes the upper cartridge 21 of the loader 22 and thrusts the same into the chamber 23. The advance of the bolt 3 and striker 7 takes place solidarily till the back tooth 24 of the striker engages the pawl 25 of the firing apparatus. The striker is then stopped in its advance while the bolt 3 prosecutes owing to inertia thrusting the new cartridge into the apposite chamber. The parts are now returned to the original position illustrated in fig. 1.

With the object of preventing the percussion of the striker against the bottom of the case of the cartridge before the closure has been completed by the bolt, there is provided, according to the present invention, a safety lever 26, which with an end 27 cooperates with the arm 13 of the angle lever 12—13 while with the other end 28 comes on the stroke of the tooth 24 of the striker 7 (figures 2—3) when the angle lever 12—13 is in the position of disengagement for the pawl 4. In this way till the pawl 4 is not snapped within the apposite notch 6 provided in the bolt and consequently the lever 12—13 is not returned into the position of fig. 1, an eventual defect of the firing apparatus or an eventual untimely actioning of the trigger 29 cannot produce the percussion of the cartridge, since the striker is held in its advance stroke by the end 28 of the safety lever 26 engaging the tooth 24 of the same striker.

A spring, not illustrated, sollicitates the safety lever 26 to be taken into the engagement position with the tooth 24. Things are arranged in such a way that by means of a convenient proportionality settled between the different arms of relative levers the lowering of the automatic safety lever 26 may take place in the right phase, that is in the exact instant when the engagement of the blocking pawl 4 into the notch 3 of the bolt 6 is positively completed.

In order to prevent the point 30 of the striker 7 from touching the capsule of the cartridge's bottom before the definitive closure of the bolt there may be, according to the present invention, between the bolt and the striker arranged a spring capable of transmitting from the striker to the bolt the advancing force during the phase of closure, this spring, however, allowing the percussion of the cartridge after the closure has been effected.

The present invention has been illustrated and described in a preferred form of realisation but it is understood that constructive changes may be introduced therein without surpassing the limits of protection of the present industrial patent.

GINO REVELLI.

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G. REVELLI
BOLT CLOSER FOR AUTOMATIC ARMS
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Fig. 1

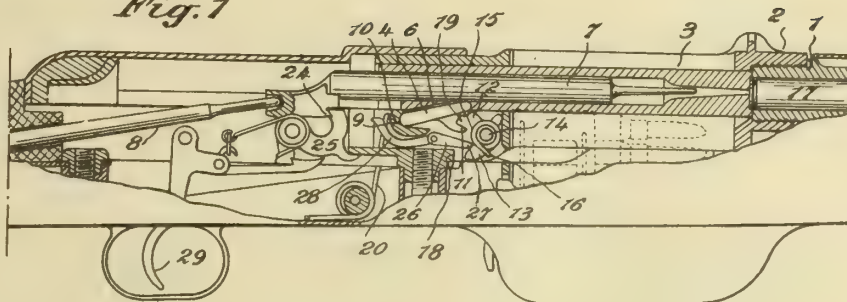


Fig. 2

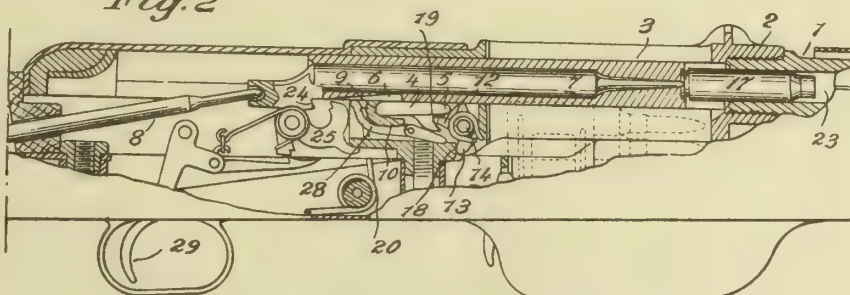
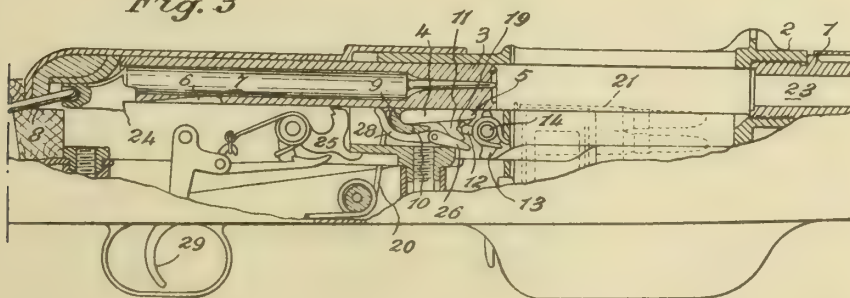


Fig. 3



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ALIEN PROPERTY CUSTODIAN

FIRING MECHANISM FOR AUTOMATIC ARMS

Gino Revelli, Rome, Italy; vested in the Alien Property Custodian

Application filed December 12, 1939

The present invention relates to a firing mechanism for automatic arms.

According to the invention a firing mechanism with double release is provided, surely and smoothly functioning, so that it is not possible to execute the so called "rafale firing" comprising a series of very rapid consecutive shots obtained with other firing mechanisms when the trigger is kept down in a certain measure.

It is well known that in the automatic arms as rifles and the like a shot at a time is wanted to be fired at command and the "rafale firing" is to be avoided.

The invention is illustrated in the accompanying drawing in a schematic form of realisation alone, but it is understood that constructive changes may be practically introduced therein without surpassing the limits of protection of the present industrial patent.

Fig. 1 of the drawing shows in full lines the parts of the firing mechanism in cocked position and in dash and dot lines the parts after the first release of the mechanism.

Fig. 2 shows the position of the parts after the shot has been fired.

Fig. 3 shows a position of the parts during the movement of the striker.

With reference to said figures the striker 1 is driven forward by the spring 2 through the rod 3. The striker 1 is provided inferiorly with a tooth 4 destined to engage the notch 5 of the pawl 6. This latter is pivoted in 7 and solicited to rotate to the left hand by the needle spring 8, an end of which 9 engages on said pawl 6 and the other end 10 acts by means of the small connecting rod 11 on the arm 12 of the angle lever 13. This lever 13 is pivoted in 14 on the firing trigger 15. The arm 16 of the angle lever 13 is anteriorly shaped like a finger in order to bear against the lower part 17 of the pawl 6. Further the arm 16 is provided with a tooth 18 destined to cooperate with the lug 19 of the pawl 6. The lug 19 is provided with two supporting surfaces 20 and 21 placed in different planes destined to

cooperate successively with the tooth 18 of the said arm 16. The parts are kept in the position illustrated by full lines in Fig. 1, when the striker is cocked, by the needle spring 8. In such a position the finger 16 bears against the lower part 17 of the pawl 6 and the tooth 4 of the striker is engaged with the notch 5 of the pawl 6.

By exercising a traction on the trigger 15 (Fig. 1, dash and dot lines) this trigger, against the action of the spring 8 exercises a traction on the angle lever 13 and conveys the tooth 18 of the arm 16 in contact with the supporting surface 20 of the lug 19 of the pawl 6, while the arm 16 slides bearing against the surface 17 of the pawl 6. The pawl 6 is displaced into the position illustrated with dash and dot lines and the tooth 18 is released from the supporting surface 20 to the supporting surface 21. The finger actioning the trigger 15 perceives this first release of the firing mechanism.

By further actioning the trigger 15 (Fig. 2) in the direction indicated by the arrow, the tooth 4 abandons the notch 5 of the pawl 6 and the striker is pushed forward by the action of its own spring 2 hitting downwards the pawl 6 (Fig. 3) by means of its own lower tappet 22 and thus determining the sure disengagement of the tooth 18 from the supporting plane 21 so that the pawl 6 free of ever engagement with the angle lever 13 may be taken back with a left-hand motion to bear against the lower plane surface 23 of the striker ready to engage the tooth 4 as soon as this tooth has fallen back in consequence of the firing of a cartridge and has advanced again owing to the action of the spring 2. Yet if the trigger 15 is kept in a retreated position, a free movement up and down of the striker is not possible, consequently the so called "rafale firing" is absolutely excluded. Said disengagement between the tooth 18 and the supporting surface 21 occurs owing to the action of the lower surface 17 of the pawl 6 against the upper surface 24 of the arm 16.

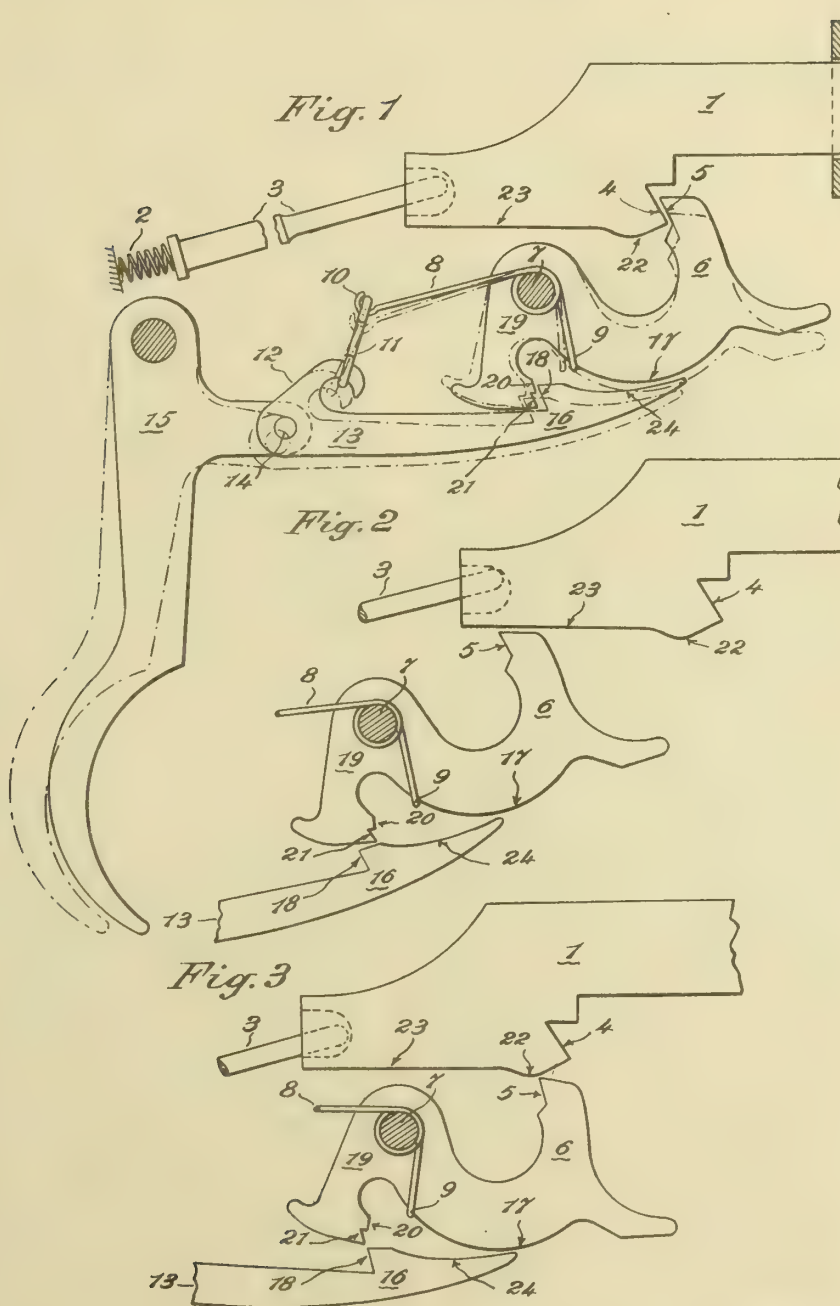
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ALIEN PROPERTY CUSTODIAN

SIGNS

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Application filed December 21, 1939

My present invention relates to signs, more particularly to signs having a movable text or display strip inserted in the path of light rays, either daylight or artificial light.

The invention has for its objects first to produce a sign in which a long movable text can be used, which is gradually moved past a window, in which the text will be visible either directly or indirectly in a mirror; second to construct the sign in a manner making it possible to place the same for advertising purposes in a shop window, in street cars and other places, where a small, but effective sign is desired; third to build up a sign, which needs no care and will run continuously when first started, only using a little amount of electric current; fourth to produce a sign, by means of which it is possible in combination with the advertising text to display the goods in a very effective and attracting way.

With these objects in mind, the sign can, in accordance with the invention be constructed in more different ways.

A text strip may be used which is guided over two rollers in one single bight, but also strips passing over several rollers may be used, or the major part of the strip may be coiled so as to form as annular coil supported, on the inside, by several rollers driven by a motor, the inner part of the strip being connected to the outer part, without being twisted. In this case the ring is rotated in such a manner that there is always supplied to the outer side thereof the same length of strip as the length removed from the inner side during the same time. In this manner the advantage is attained that a very long strip with a correspondingly long text can be used in a relatively small space.

In order to attain as brilliant an effect as possible, especially when a perforated strip is used, I may fit the glass pane of the window with optically acting projections or the like, preferably small hemispheres of about the same size as the perforations, and thereby the advantage is attained that the small projections on the front face of the pane will have the effect of small luminous lamps which owing to the motion of the strip will have a gleaming appearance. The mirror should be adjustable, in such a manner that the light reflected towards the pane will be as favourable as possible. It may be of special advantage to arrange the mirror to be swung in such a manner that during daytime it can catch the daylight and project the same through the holes in the perforated strip, while during the night it can be swung into such a position that

it will catch the light from lamps disposed either within the casing of the sign, or outside the same. The mirror may be partly transparent, if desired, in such a manner that light from the rear side of the mirror can also be taken into use, and the mirror may be connected to contacts serving to close and break the electric-current supply to the lamp, in such a manner that the same will be extinguished when the sign acts as a daylight sign.

The sign is thus especially suited to utilize the daylight coming from above during daytime. Instead of daylight, lamps may be disposed above the sign so as to project the light downward towards the mirror. Such lamps should preferably be shaded, so that they do not project the light forward in the same direction as the mirror.

The lamps serving to illuminate the sign may at the same time be utilized for other purposes, for instance for lighting a vending machine.

In many cases it is important that the portion of the sign that contains the opening, through which the text of the sign can be read, should have very small dimensions, in such a manner that it easily can be disposed at a point at which the text is desired to be read. The motor with driving pulley belonging thereto and serving to feed the ribbon forward may then be disposed at a hidden place. Hereby it becomes feasible to dispose such signs at points where otherwise they could not be placed, owing to the space they would otherwise occupy. This applies especially to the mounting in store windows or similar places.

According to the invention, this object is attained in that the casing or box is fitted with a long and narrow box part enclosing narrowly the forward running and returning parts of the ribbon, and which contains the openings through which the text can be read.

The invention comprises also special constructions of the narrow box part by which the field of usefulness of the same is increased.

The box part may thus be detachably fastened to the casing encircling the driving motor, and may enclose a rod disposed thereon and supporting, at its free end, a spring-actuated supporting roller for the ribbon part running forward and back through the box part.

Hereby an easy exchange of the ribbon is rendered possible, if it is desired to alter the text.

In order that the sign may easily be adjusted to windows of various sizes, it is preferable to let the box part be telescopic, so that the same can be pulled out or pushed in, all according to the

conditions of space at the place where the sign is to be placed.

The box part may further be fitted with lighting devices of a kind known per se. Outside of the box part the ribbon may run, in a manner known per se, as many bights passing over many rollers, in such a manner that a very long ribbon with a correspondingly long text can be contained in the box enclosing the driving motor. It is, however, also feasible to dispose a long ribbon forming several bights and passing over several rollers, in the long and narrow box part.

The entire sign with the driving mechanisms belonging thereto may also be disposed in a drawer adapted to be pulled forward, and again pushed into position, in the apparatus in which the sign is disposed, for instance a vending machine.

A few constructions of the invention are illustrated on the drawing, in which

Fig. 1 shows a sign in side elevation,

Fig. 2 section II—II in Fig. 1,

Fig. 3 shows a sign in side elevation,

Fig. 4 section IV—IV in Fig. 3,

Fig. 5 the extreme end of a supporting bar for the ribbon, to a larger scale,

Fig. 6 section VI—VI in Fig. 5, and

Fig. 7 a sign in side elevation.

The sign consists essentially of a box 1 fitted with a cover 2 which in the construction shown in Figs. 1 and 2 does not cover the entire upper side of the box, but leaves an opening with a window-pane 3 free, so that light from above can strike an obliquely disposed mirror 4 provided in the box, in such a manner that the same will project the light rays forward through an opening 5 in the front face of the box. Just behind the pane 3, a strip 7 is passed over rollers 6, 6₁ and 6₂. The strip 7 may preferably be made from an opaque material, for instance black paper, in which a text is produced by perforation.

The strip 7 should preferably be endless, and be moved forward past the pane 3 by means of a motor, disposed in the lower part of the box 1 not shown on Figs. 1 and 2.

Instead of perforated letters or the like on the strip, transparent letters or dark letters on a transparent background may be used.

On account of the strip 7 being directed quite closely past the pane 3, no light can escape through the pane, without having passed the strip.

As it may be of importance, in many cases, that the box enclosing the window with the strip and the mirror should take up as little space as possi-

ble, the driving motor for the same may be disposed outside of the box. The box may then be dimensioned in such a manner that it does not take up much more space than the strip, neither vertically nor horizontally, and the strip may be returned along the box, on the other side of the mirror, as shown in Figs. 1 and 2.

The sign shown in Figs. 3-6 consists mainly of a box 8 in which a driving motor 9 for a driving pulley 10 is disposed. To the top side of the box a long bar 11 is attached which at its free end carries a supporting roller 12 which is journaled in two plates 13 united by a transverse plate 14 inserted in a slot 15 formed in the end of the bar 11 and terminating in a hole 16 in which a spring 17 is inserted which tends to press the plate 14 and, thereby, the roller 12 outward. An endless text ribbon 18 passes around the rollers 12 and 10. On the upper side of the box 8 keys 19 are provided which can engage corresponding grooves in the side of the long narrow box part 1 which tightly encloses the ribbon parts passing around the rollers 12 and 10, and is fitted with openings with corresponding panes 3 through which the letters 22 on the ribbon 18 can be read.

When the motor 9 through the gearing 20, 21 sets the roller 10 into a rotary motion, the text ribbon will be moved forward past the opening panes 3, and the advertising text can then be read through the same. The box 8 can be disposed in a hidden place, so that merely the long narrow box part 1 will be visible.

The driving roller 10 may support a friction roller 23 disposed outside of casing 8 or a gear-wheel, which is in contact or engagement with a disc 24 which is rotatably disposed on the top side of the sign, and thus will be rotated simultaneously with the motion of the text ribbon. On the disc, articles 25 to be displayed can be placed, and the public can thus observe the same from all sides during their rotary motion. The advertising value will be enhanced by displaying on the disc 24 the articles nearer described in the movable text. In order to make the text visible electric lamps 29 are disposed in the box 1.

In the construction shown in Fig. 7, there is provided, on the upper side of the motor box 8, a box consisting of three parts 26, 27 and 28 forming a telescoping long and narrow box part enclosing the text band. By this construction the advantage can be attained that the length of the sign can easily be adjusted according to the space conditions at hand, as the box part 26-28 can be pulled out or pushed together.

MAGDALIN CHRISTIAN GLEERUP MØLLER.

Fig. 1.

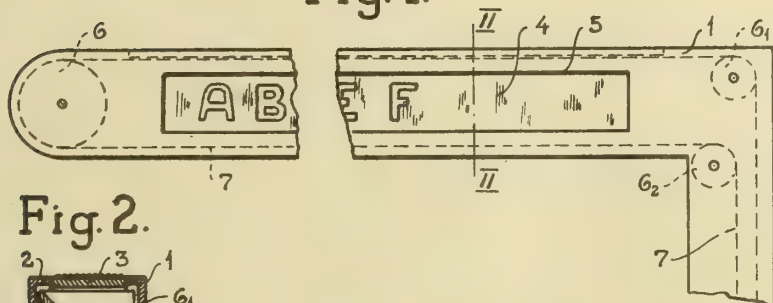


Fig. 2.

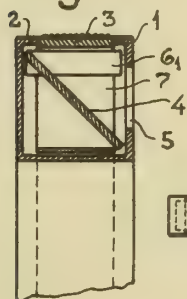


Fig. 3.

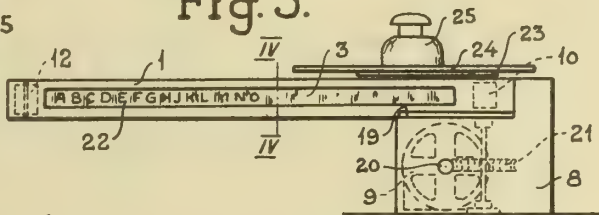


Fig. 4.

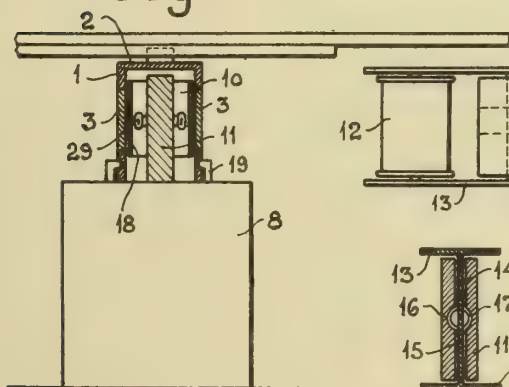


Fig. 5.

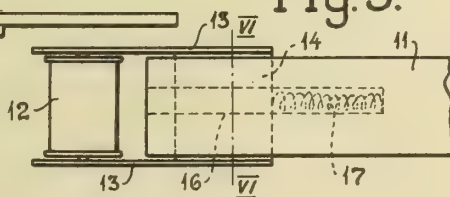


Fig. 6.

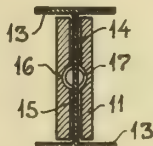
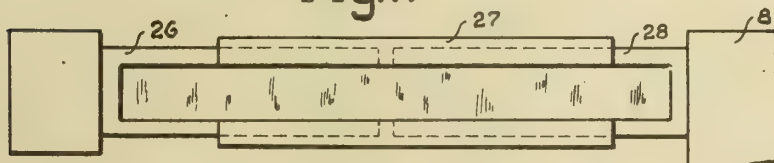


Fig. 7.



Inventor
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ALIEN PROPERTY CUSTODIAN

APPARATUS FOR PLOTTING MAPS FROM PHOTOGRAPHS

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the Alien Property Custodian

Application filed January 5, 1940

The invention relates to an apparatus equipped with a fixed binocular observation system for the stereophotogrammetrical plotting of two photo plates, each of which is displaceable relative to the observation system and parallel to its emulsion-plane by means of a guide rod capable of a universal angular movement about a fixed point.

In order to make such an apparatus adaptable for the plotting of aerial photographs taken in any respective position of the recording cameras, without requiring any alteration in the respective inclination of the photo plates and thus obviating a complicated system of observation, provision is made, in accordance with this invention, for a three-component, spatial system of cross-slides for controlling each of the two guide rods. The carrier of each of the two cross-slide systems is mounted capable of performing universal swiveling movements relative to the observation system, the slides of each of the three pairs of individually corresponding slides of the two cross-slide systems being coupled for the purpose of a joint drive in such a manner that a given moment of the driving member produces equal displacements of these two slides.

In order to avoid being tied down to a given focal distance it is advisable that relative to the respective fulcrum of the guide rod each of the two joints by which the two guide rods engage the plate carriers, are adjustably disposed perpendicular to the emulsion plane of the respective photo plate. If necessary, also each fulcrum of the guide rod can be adjustably disposed relative to the respective photo plate.

In order to give the photo plates, before plotting, that particular position relative to the observation system necessary to meet requirements with regard to the length of the camera base line and to the desired plotting scale, it is expedient to assign to the driving device of each of the said three pairs of slides at least one differential permitting a reciprocal adjustment of the two slides of each pair in accordance with the component of the camera base line corresponding to the directions of displacement of the two slides.

It is to be recommended that each of the two guide rods rests on the respective cross-slide system and is coupled with a device in order to nullify at the point of the fixed fulcrum of the guide rod, for any position of the latter, the bearing pressure acting in a direction perpendicular to the guide rod. For this purpose it is of advantage that on the free end of each of the two guide rods a spring engages, which is mounted on the framework of the apparatus and capable of performing

a universal angular movement about a point situated perpendicularly over the fixed fulcrum of the guide rod and whose distance from the said fulcrum should suitably be at least as long as the length of the guide rod.

In Fig. 1 of the accompanying drawing, diagrammatically, a perspective view is given illustrating a constructional example of a plotting apparatus according to the invention for tracing horizontal projections of a landscape derived by the stereoscopic observation of two photo plates obtained by aerial photography. Fig. 2 illustrates a driving mechanism and Fig. 3 the tracing table of the apparatus in question.

The plotting apparatus comprises a housing 1, to which a binocular observation instrument 2 with collimating marks is fitted, the objective sleeves and eyepiece sleeves being designated 3 and 4, and 5 and 6, respectively. The observation instrument serves for the stereoscopic observation of two photo plates 7 and 8 which, parallel to their emulsion planes, are displaceably mounted to housing 1 in such a manner that the emulsion planes lie perpendicular to the viewing directions of the observation instrument. A cross-slide system consisting of two slides 9 and 10 displaceable towards each other at right angles serves for shifting the photo plate 7, whilst for shifting photo-plate 8 a cross-slide system is provided for consisting of two slides 11 and 12 displaceable towards each other at right angles. In order to allow for swinging, each of the photo plates on the top slide of the respective cross-slide systems 9, 10, and 11, 12, respectively, is mounted for adjustments about an axis which lies at right angles to the directions of displacement of the two slides of each cross-slide system.

The following arrangement has been adopted for adjusting the slides 9 and 10 of the cross-slide system carrying photo plate 7 relative to the binocular observation instrument 2. On the bearing 13 screwed to housing 1 a box 14, by means of a shaft W_1 (cf. Fig. 2) is mounted for rotations about an axis $M-M$ parallel to the direction of displacement of slide 9. In the box 14 a supporting member 15 is mounted for rotations about an axis $N-N$ intersecting the axis $M-M$ at right angles. To balance the weight, box 14 carries a counter poise 44. By means of a flexible shaft 17, the shaft 16 is coupled with shaft W_2 (cf. Fig. 2) parallel to shaft W_1 and rotatably mounted on housing 1. The supporting member 15 carries two spindles 18 and 19, whose axes are parallel to one another and determine a plane perpendicular

to the axis N—N. Alongside the spindles 18 and 19 a slide 20 is displaceably disposed. Its direction of displacement is indicated by an arrow and designated Z. The spindle 19 is provided with a screw thread and by means of a flexible shaft 21 coupled with a shaft W₃ (cf. Fig. 2) parallel to shaft W₁ and rotatably mounted on housing 1. The slide 20 carries two spindles 22 and 23 whose axes are parallel to the axis N—N. Alongside the spindles 22 and 23 a slide 24 is displaceably disposed. Its direction of displacement is indicated by an arrow and designated Y, and lies at right angles to the direction of displacement Z. The spindle 23 is provided with a screw thread and by means of a flexible shaft 25 coupled with a shaft W₄ (cf. Fig. 4) parallel to shaft W₁ rotatably mounted on housing 1. The slide 24 carries two spindles 26 and 27, whose axes are parallel to one another and right angles to the plane determined by the directions of displacement Z and Y. Alongside the spindles 26 and 27 a slide 28 is displaceably disposed. Its direction of displacement is indicated by an arrow and designated X, and lies at right angles to the directions of displacement Y and Z. The spindle 27 is provided with a screw thread and by means of a flexible shaft 29 coupled with a shaft W₅ (cf. Fig. 2) parallel to shaft W₁ and rotatably mounted on housing 1. The slide 28 carries the spherical socket 30 of a ball bearing whose ball 31 is attached to one end of a guide rod 32. The guide rod 32 is displaceable in two sleeves one of which, 33, is mounted for universal angular movements in a ball socket 34 fitted to housing 1 by means of an arm 35, whilst the other, 36, also for universal angular movements, is mounted in a ball socket 37, fitted to housing 1. By means of a slide fitting 39, the arm 38 is adjustable along a square pin 40 which is so disposed on a plate 41 firmly connected with the slide 10 that its axis is at right angles with the emulsion plane of the photo plate 7. By adjusting the arm 38 along the pin 40, the component of the mutual distance between the ball joints 33, 34, and 36, 37 which is at right angles to the emulsion plane of the photo plate 7, can be set in accordance with the principal distance which was adjusted when the photo plate 7 was exposed. The indicating device (a scale on pin 40 and an index on the slide fitting 39) as well as a clamping device for clamping the arm 38 relative to pin 40, required for such setting, have for the sake of simplicity been omitted from the drawing. By means of a spring 42 engaging the free end of the guide rod 32, the latter is so suspended on one arm, 43, of a double-armed cross beam firmly connected with the binocular observation system, that the point of application of spring 42 on the arm 43 lies perpendicularly over the ball joint 33, 34. The length of the spring 42 somewhat exceeds that of the guide rod 32.

For adjusting the slides 11 and 12 of the cross-slide system carrying photo plate 8 relative to the binocular observation system 2 provision is made for an arrangement which is identically the same, as reflected by a mirror, as the arrangement co-ordinated to photo plate 7, as described in the foregoing. The individual parts of this arrangement are designated exactly like the corresponding parts of the described arrangement except for an index line added to each designation.

For adjusting the five pairs of shafts W₁, W₁'; W₂, W₂'; W₃, W₃'; W₄, W₄' and W₅, W₅' five gearings of the design shown in Fig. 2 are provided for. Excepting those parts of the five gearings displayed in Fig. 1 of some of the gearings and

which for this reason must have several designations, each part bears one designation only. Each of the five shafts W₁, W₂, W₃, W₄ and W₅ carries the one crown gear, 45, of a differential gear 46, whose other crown gear 47 is mounted upon a shaft 48 which, by means of a pair of bevel gears 49 can be driven through a shaft 50. Shaft 48 also carries the one crown gear 51 of a second differential gear, 52, whose other crown gear 53 is mounted on the shaft W₁'; W₂'; W₃'; W₄'; W₅'; respectively. By means of a pair of bevel gears 56 and of a shaft 57 a rotation can be imparted to the planetary pinions 54 and 55 of the differential gear 46, about the common axis of the crown gears 45 and 47, whilst the planetary pinions 58 and 59 of the differential gear 52 can be rotated about the common axis of the crown gears 51 and 53 by means of a pair of bevel gears 60 and of a shaft 61. For driving the shafts 50, 57 and 61, driving disks are provided for as follows: driving disks H_w'', H_w, H_w' respectively, for the gearing for adjusting the pair of shafts W₁, W₁'; driving disks H_p'', H_p, H_p' respectively, for the gearing for adjusting the pair of shafts W₂, W₂'; driving disks H_z'', H_z, H_z' respectively, for the gearing for adjusting the pair of shafts W₃, W₃'; driving disks H_y'', H_y, H_y' respectively, for the gearing for adjusting the pair of shafts W₄, W₄'; and driving disks H_x'', H_x, H_x' respectively, for the gearing for adjusting the pair of shafts W₅, W₅'. The driving disk H_z' is a foot disk (cf. Fig. 1).

The driving disks H_w'', H_p'', H_z'', H_y'', and H_x' are coupled with the counting mechanisms G_w'', G_p'', G_z'', G_y'', G_x'', respectively, by means of a pair of toothed wheels 62; the driving disks H_w, H_p, H_z, H_y and H_x are coupled with the counting mechanisms G_w, G_p, G_z, G_y, G_x, respectively, by means of a pair of toothed wheels 63, and the driving disks H_w', H_p', H_z', H_y' and H_x' are coupled with the counting mechanisms G_w', G_p', G_z', G_y', G_x', respectively, by means of a pair of toothed wheels 64.

The driving disks H_x' and H_y' are coupled with shafts 65 or 66, respectively, which on their part are coupled with shafts 65' or 66', respectively, (cf. Fig. 3). For the sake of simplicity the couplings have been omitted in the drawing. The shafts 65' and 66' are parallel to one another and are rotatably mounted upon a drawing table 67. The shaft 65' is provided with a right hand screw thread and is coupled with a shaft 71 by means of two pairs of bevel gears 68 and 69 as well as with a shaft 70 mounted on the drawing table 67. The shaft 71 is provided with a left hand screw thread and is so mounted on the drawing table 67 that its axis runs parallel with the axis of shaft 65. The shaft 65' and 71 serve as a slideway for a slide 72 which experiences a displacement along the shafts 65' and 71 when the driving disk H_x' is actuated. On slide 72 a slide 74 carrying a drawing pencil 73 is disposed displaceably at right angles to the direction of displacement of the slide 72. The slide 73 engages a threaded spindle 75 rotatably mounted on slide 72 in such a manner that its axis lies parallel to the axes of shafts 65' and 71. The spindle 75 carries a bevel gear 76 meshing with a bevel gear 77 which is disposed displaceably along the shaft 66'. Shaft 66' is provided with a groove so that the bevel gear 77 must partake in the rotations of shafts 66'. In order to maintain the working contact between bevel gears 76 and 77 a catch 78 fitted to slide

72 is provided for to engage in a ring groove of the hub of bevel gear 77.

To make the apparatus ready for the plotting of photo plates that respective point may be proceeded from where the photo plates 7 and 8 are in such a position relatively to the observation instrument 2 that the collimating marks of the observation instrument 2 coincide with the principal points of the photo plates, (i. e., with those points where the optical axes of the camera objectives pass through the photo plates during the exposure) and that the directions of displacement of the Z-slides 20 and 20' as well as the guide rods 32 and 32' are at right angles to the photo plates. This is the position when the apparatus is in zero-adjustment and where the counting mechanisms G_w , G_p , G_z , G_y , G_x , G_w' , G_p' , G_z' , G_y' and G_x' indicate the initial reading. Starting from this position the groups of driving disks H_x , H_x' ; H_y , H_y' ; and H_z , H_z' , must be so set that the sums of the readings indicated by the counting mechanisms G_x and G_x' , or G_y and G_y' , or G_z and G_z' , respectively correspond to the values b_x , b_y and b_z , i. e. to the components, measured on copying scale, of the camera base line respecting a rectangular spatial system of coordinates. In addition to this the driving disks H_w , H_w' , H_p , H_p' and also, if necessary, H_w'' , H_p'' must be set in such a manner that the directions of displacement of the Z-slides 20 and 20' have the same inclination to the photo plates 7 and 8 as the optical axes of the camera objectives had to the horizontal plane when the photo plates 7 and 8 were exposed.

All that is required to operate the apparatus

is to continuously actuate the driving disks H_x'' , H_y'' and H_z'' in such a manner that, to the observer at the observing instrument 2, the floating pointer remains in apparent contact with the stereoscopic model of the landscape, as obtained from the two photo plates 7 and 8, during any movement of the floating pointer relative to the model, or vice versa. The drawing pencil 73 then draws upon the drawing table 61 the horizontal projection of the line traced by the floating pointer along the said stereoscopic model. The said line will be a contour line if the driving disk H_z'' is not moved.

Obviously the aforementioned apparatus can be used in conjunction with a great variety of devices which proved useful in connection with the known types of plotting machines such as, for instance, a device for interchanging the path of rays for the conjunction of successive photographs, or, a device permitting pictures presented to observer's eye being turned relative to one another, or, a device to alter the magnification of these pictures; or to provide switch-over devices coordinated to the driving disks H_x'' , H_y'' , and H_z'' in order to have the option of working either with right or left hand rotation of the driving disks at one and the same movement of the floating pointer relative to the stereoscopic model obtained from the photo plates or vice versa; or a device for transmitting upon the drawing pencil the movement of the driving disks H_x'' and H_z'' , or H_y'' and H_z'' , respectively, instead of the movement of the driving disks H_x'' and H_y'' .

WALTHER BAUERSFELD.



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APRIL 27, 1943. APPARATUS FOR PLOTTING MAPS FROM PHOTOGRAPHS 312,533

BY A. P. C.

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2 Sheets-Sheet 1

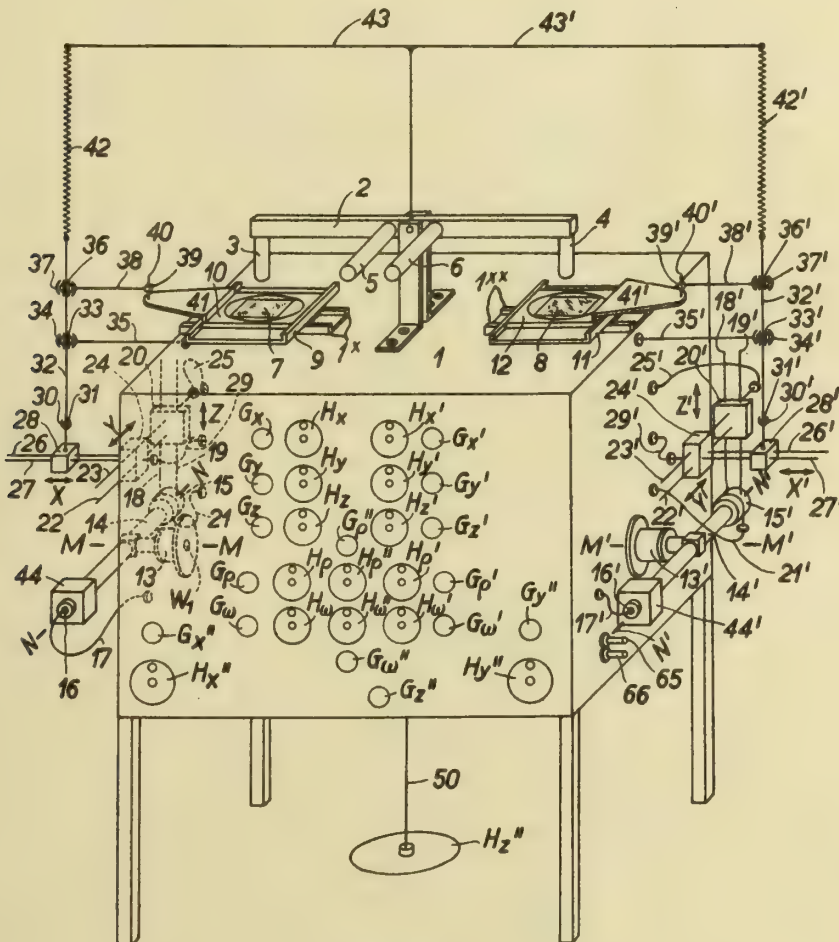


Fig. 1

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2 Sheets-Sheet 2

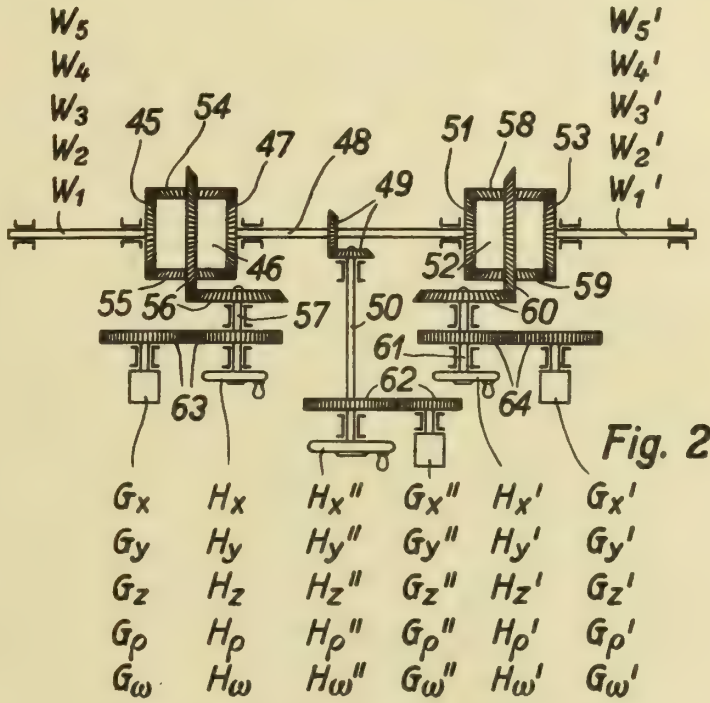


Fig. 2

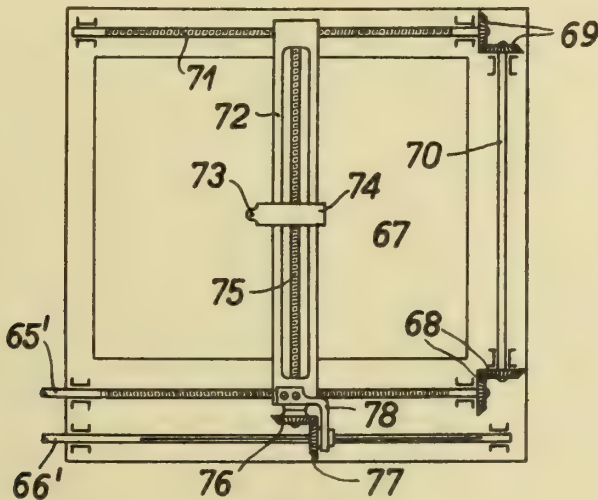


Fig. 3

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MANUFACTURE OF SHAPED PRODUCTS, SUCH AS FLEXIBLE TUBES, THIN SHEETS OR THREADS, FROM ANIMAL FIBROUS STARTING MATERIALS

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No Drawing. Application filed January 9, 1940

The invention relates to the manufacture of shaped products, such as flexible tubes, thin sheets or threads, from animal fibrous starting materials.

It is known to convert animal fibrous starting materials into highly swollen fibrous masses, to produce shaped products of every kind by shaping these swollen masses, for example by extrusion through nozzles, and to solidify these shaped products and to impart more or less waterproof properties thereto by drying and hardening or tanning. Artificial gut, membranes or threads are produced in this manner.

Shaped products as aforesaid may for example be produced according to the processes of the Applicants British Patents Nos. 429,039, 429,040 and 433,245 by converting animal fibrous starting materials by the action of swelling chemicals and, if necessary, a mechanical shredding treatment into fibrous hide pastes containing large proportions of swelling water and shaping the said pastes by extrusion through nozzles or pressing between rollers. The resulting shaped products are dried and thereafter rendered waterproof in a suitable manner. According to these processes fibrous masses are worked up which contain for example 75 to 90% and more of water, but are still of such consistency that products shaped thereof are capable of maintaining their shape unsupported. Shaped products can be formed therefore of such fibrous masses by mere extrusion in a dry spinning process or other dry shaping processes.

Highly swollen masses, which contain so much water that they do not retain their shape unsupported, however, cannot be shaped by a dry spinning process. In effect such masses, when being shaped, for example by extrusion through nozzles, would pass the nozzle without maintaining the shape given to them. The present invention relates especially to an improvement in the process of producing shaped products from such highly swollen masses.

According to this invention it has been found that shaped products may be obtained by treating highly swollen fibrous masses, especially masses containing water in such large quantities that shaped masses thereof are incapable of maintaining their shape unsupported by imparting shape to such highly swollen masses and immediately thereafter treating such shaped masses with aqueous deswelling solutions to solidify the shaped masses and only then drying the shaped solidified masses obtained thereby and rendering them waterproof by tanning or hard-

ening. Such masses are shaped according to the invention by the combination of a mechanical shaping, for example by extrusion, and the immediate introduction into deswelling liquids. The present process is a true wet spinning process.

The process of this invention is carried out by subjecting animal starting materials, such as hide, hide waste, sinews, flesh, muscular tissue, leather and the like, to a swelling treatment supplemented by mechanical treatments, care being taken to ensure that fibrous masses rich in water are obtained. Aqueous solutions of bases, for example lime, soda lye or ammonia are employed as swelling agents. Preferably milk of lime and caustic soda lye are employed successively.

The mechanical treatment consists in a careful disintegration of the swollen materials, for instance in swelling these materials in such a way that the fibres are retained as far as possible in their original condition and in this way impart particular strength to the shaped products.

The highly swollen fibrous materials containing for example more than 90% of water are worked up with the aid of known tearing and grinding apparatus, as far as possible without damaging the fibres, to a fibrous mass devoid of lumps. This mass may be further homogenised in mixing or kneading apparatus, whereby considerable quantities of water may be incorporated therewith. Masses containing for example 96% of water are thus obtained. In its external properties the resulting fibrous mass in the case of a very high water content, for example 98 to 99% of water, to a large extent resembles a solution. In certain circumstances the boundaries between swelling and solution may even disappear to such an extent, that the individual fibres can no longer be recognised and the resulting mixtures can be forced through fine filters.

The fibrous masses may be further worked up as such. It is however frequently advisable in order to effect stretching or to alter the properties, to add to the animal fibrous masses fibres or threads of vegetable origin. Natural or artificial fibres of cellulose or its derivatives have proved to be particularly suitable for this purpose. Viscose may for example be with advantage added to alkaline-swollen fibrous masses.

The resulting fibre mixtures rich in water are shaped, for example by extrusion through annular, slot-shaped or perforated nozzles, or in another manner, for example by pressing between rollers, and, in contradistinction to the known processes, be treated immediately after leaving

the shaping devices with deswelling, i. e. water-removing agents.

During the shaping operation it is advisable to ensure that the fibres are disposed adjacent one another and become felted since the strength of the resulting shaped products is improved thereby.

In the production and shaping of the fibrous mixtures rich in water the decomposing effects of the swelling agents must be repressed without the swelling effects being simultaneously reduced. This may for example be effected by preventing the material from being heated to more than 22° C. by artificial cooling. The operation is with advantage carried out even at temperatures below 15°C.

The treatment with water-removing agents is effected by introducing the products discharging from the shaping devices into water-removing baths. Water-removing salt solutions, such as solutions of common salt, ammonium chloride or sodium sulfate, may be used for the aforesaid purposes. The water-removing action of these baths may be increased or accelerated by adding to the baths agents which neutralise the swelling agents. A particularly advantageous procedure is to select the composition of the water-removing bath in accordance with the swelling agents employed for the production of the fibrous masses in such a way that shaped products produced from alkaline-swollen fibrous masses are coagulated in acid baths. If, for example, swelling has been effected with lime and soda lye, hydrochloric acid or ammonium chloride is used as coagulating bath.

Finally there may be added to the water-removing fixing or coagulating baths agents which have a tanning or hardening action, for example formaldehyde and other aldehydes, distillates from cellulose-containing starting materials, such as wood smoke condensates, mineral tanning agents, for example aluminium and chromium salts, animal tanning agents such as train oil or train oil acid, vegetable or synthetic tanning agents or salts which do not remove water, such as acetates, sulfites or benzoates.

Different water-removing, fixing or coagulating baths may of course also be employed in succession. During this treatment the surface of the shaped products becomes more or less considerably solidified.

In general the shaped products are subjected on all sides to the action of these treatment baths. In some cases it may however be advisable only to apply the water-removing agents on one side. Thus for example in the treatment of flexible tubes, the water-removing agents may be introduced under slight pressure from the core of the shaping nozzle into the interior of the tube, whilst the outer surface of the tube is treated only with water. Flat products may be treated on one side by passing over water-removing baths. The water liberated by the action of the

water-removing agents from the highly swollen shaped products may be thereafter entirely or partially removed by mechanical treatment in suctional filters or wringers.

The final solidification of the shaped products is effected in a manner known per se by drying and hardening or tanning, it being in most cases advisable to allow the drying to precede the final tanning operation and in this way to impart the requisite strength to the shaped products. In the cases in which the deswelling solutions contain also tanning agents and/or hardening agents a special tanning or hardening after the drying may be dispensed with.

The process of this invention is attended with considerable advantages. It enables particularly fine and yet sufficiently strong products to be produced. Considerable economies in starting materials are obtained thereby. Moreover the fibrous mixtures rich in water may be shaped under considerably lower pressure. According to the process of this invention fibre mixtures rich in water, for example containing more than 90% of water, such as could not be worked up continuously and without supporting means by the applicants' earlier processes and the resulting shaped products of which did not possess sufficient resistance to enable them to be conveyed without support on discharging from the shaping device, may be continuously worked up. Finally animal starting materials may be employed according to the process of this invention which owing to their intense swelling properties could hitherto only be with difficulty worked up, such as calf leather scraps or sinews.

The process of this invention may be particularly successfully applied to the manufacture of flexible tubes, which may for example be used as artificial gut or sausage skins. It enables sausage skins to be manufactured which after filling with sausage meat retain even after prolonged keeping, the smooth appearance, similar to that of sausages made from natural gut. If the gut produced according to this invention is sufficiently hardened or tanned it will completely withstand boiling. It is moreover easily cut, is impermeable to fat and water, but on smoking enables the smoke or fumigating gases to penetrate and the sausage to "breathe."

The production of the artificial sausage skins may be effected with the aid of known apparatus, with particular advantage with the aid of the apparatus described in British Patent Specification No. 433,245. In contradistinction to the process there described however the artificial sausage skin is treated immediately after discharging from the annular nozzle with water-removing fixing or coagulating solutions. It is advisable in this case to allow the gut to fall freely from the shaping device into the treatment baths and in addition to irrigate or rinse the gut internally with the treatment liquid.

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ALIEN PROPERTY CUSTODIAN

METHOD OF MANUFACTURING BLADES FOR EXHAUST TURBINES

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Application filed January 17, 1940

Hollow blades for exhaust gas turbines are partly made of correspondingly shaped sheet metal and partly the blades are milled from the solid. It is known with blades milled from the solid to divide the blade midway in the rotor plane and to machine each blade section separately. When fitting the blade sections into the rotor they are joined together under pressure to a full blade.

The manufacture of the blades by milling in connection with the procedure of dividing them midway through the rotor plane among others brings about the advantage, that the wall cross sections of the blades can be made corresponding to the occurring stresses for which reason these blades with respect to others can be exposed to increased rotational speeds.

The invention now proposes a method of manufacturing adapted to preserve the advantages obtained by the beforementioned way of dividing and machining the blades and in addition thereto is rendering possible for the first time the construction of a one-piece blade.

After the method according to the invention firstly single blanks are made of which two each are corresponding to the dimensions of a single blade to be made therefrom. Out of these blanks is machined one symmetrical half each of the blade bore facing the gas inlet side resp. the gas outlet side, and furthermore both or at least one of the corresponding exterior edges of the blanks are chamfered about shortly before the interior blade groove begins. Finally two each of the blanks treated in the described manner are welded together at the chamfered edges.

The blade blank being now in one piece and with the provided interior form, finally is given the desired exterior shape, i. e. a blade root with any cross section and a suitable blade form are machined.

In order to prevent the occurring of welding beads or the like during the welding process there is fitted into the blade bore, according to the invention during welding, a false core which

is adjusted to the hollow space within the complete blade and consists of suitable material, e. g. with graphite coating. In this manner there is obtained that the blade bore remains perfectly smooth and that no unforeseen stressing of the blade is caused during operation by centrifugal forces eventually produced by the welding material entering the hollow space within the blade halves during the welding process. Further the smooth inner blade bore obtained according to the invention assures a passage which offers no resistance to the flow of the cooling air.

By means of the method according to the invention it is rendered possible for the first time to make a one-piece hollow blade milled from the solid, in which by the welding in no way an additional stressing is caused, but only the advantages connected therewith are utilized. The principal advantage is to be seen in that also with the one-piece blade, which has considerable advantages over the two-piece blade, the most favourable arrangement as to wall cross sections and blade form can be provided which in the case of blades milled from the solid only was possible with two-piece blades.

In the drawing the different figures show the succession of the single working processes after the method according to the invention.

Fig. 1 shows an elevation and Fig. 2 a top view of a, by way of example, rectangular blank of a blade before welding together.

One half 1 of the hollow space 2 within the blade halves is milled into the blank 3 and the inner edges 4 and 5 are chamfered.

Fig. 3 is a longitudinal section transversely to the direction of the rotor plane through the blade block welded together, whilst Fig. 4 is a top view of this block with the finished inner bore 2.

Fig. 2 shows a blade also finished as to its exterior form.

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BY A. P. C

G. ZELLBECK ET AL
BLADES FOR EXHAUST TURBINES AND THE
METHOD FOR THE MANUFACTURE THEREOF
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Serial No.
314,204



Fig. 1

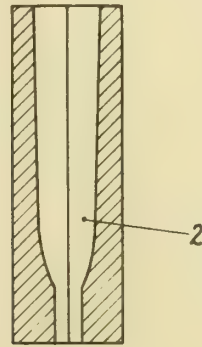


Fig. 3

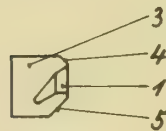


Fig. 2



Fig. 4

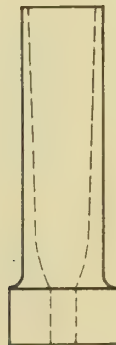


Fig. 5

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PROCESS AND APPARATUS FOR CONTINUOUSLY PRODUCING PLASTIC MASSES

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Application filed January 18, 1940

The present invention relates to a process of continuously producing plastic masses.

The production of plastic masses generally and in particular the plasticizing of materials or mixtures, capable of reacting which during manufacture to a slight degree only should be subjected to a chemical reaction, are effected discontinuously upon heatable and coolable calenders provided with two rollers, whereby friction is applied. This kind of production requires considerable manual labour, because the raw materials form a sheet or skin only after being several times fed to the gap formed between the pair of rollers. Moreover, this sheet or skin must be several times removed from the roller by a knife and returned again to the rollers. The further treatment, particularly the cooling of the sheet or skin, heated by the friction heat, also is rather troublesome and expensive. The milling machines are badly utilized and unduly strained by loads occurring by shocks.

It has already been proposed to continuously mix and plasticize raw rubber by supplying same in blocks at one side of a pair of rollers provided with a conveyor belt as well as with a plurality of inclined plough-shaped guide discs resting upon about a quarter of the circumference of the so-called supporting roller, i. e. the roller which supports the sheet or skin. The pair of rollers, moreover, is provided with metal sheets, extending vertically to the gap, formed between the rollers, and subdividing into chambers the space above the gap. The conveyor belt is necessary for feeding raw rubber, falling through the gap, again to the upper surface of the rollers. The inclined guide metal sheets as well as the vertically arranged guide metal sheets serve to continuously guide the rubber along the rollers. The formation of a sheet or skin, however, is not yet effected upon the pair of rollers according to this proposal, but further conveyor belts and milling machines are required to finally be able to continuously produce a band of plasticized raw rubber. To obtain rubber mixtures capable of being pressed it has been proposed to arrange two further milling machines behind this pair of rollers which alternately, that is discontinuously effect the mixing with the fillers.

The present invention avoids the disadvantages of discontinuously calendering upon a calender provided with two rollers, requires, however, nevertheless a single pair of rollers only for the production of plastic masses capable of being pressed. The auxiliary devices required are of most simple construction and of considerable

durability in contradistinction to the method of operation carried out upon a plurality of milling machines arranged one behind the other according to the above mentioned proposal.

It has been found that under certain conditions the movement of the plastic mass from the charging device to the removal device is effected automatically in the gap formed between the pair of rollers, so that the arrangement of large metal sheet constructions for guiding the mass in about a helical path is unnecessary. In practice these metal sheet constructions tend to bend due to the large pressure exerted upon them by the starting movement of the plastic masses. Moreover, when carrying out the new method, a conveyor belt need not be provided for guiding upwardly again material falling through the gap formed between the pair of rollers, because according to the present method the raw material cannot fall through said gap.

In its most simple form the invention consists in removing the ordinary long severing or stripping off knife provided at the so-called supporting roller of an ordinary calender having two rollers and mounting instead of this knife other severing knives of a width of preferably about 100 mm at the same place at the outer left- and right hand side. The use of more severing knives is possible, but not advisable. Also one severing knife may be used, but this is less advantageous. These severing or stripping off knives permanently are pressed against the roller by suitable means, e. g. by means of a spring. Moreover, some, preferably one continuously operating charging device for the raw plastic material is arranged, preferably about above the middle of the milling machine. Finally in the manner known in discontinuously working methods a sheet or skin is produced at the beginning and then, after adjusting the ordinary temperatures a raw material is continuously added in such a quantity that in the gap formed between the pair of rollers always as much material only is present as is required for causing the rollers to apply the necessary pressure. The ordinary temperatures vary between 40 and 250° C. In the case of quick press masses the supporting roller has 80-110°, the counter roller 40-90° C.

Hereby it is observed that the sheet or skin once produced is continuously maintained and is strongly intermixed with raw material in the middle zone of charging only. At the lateral stripping off knives the sheet or skin is continuously enlarged so that pieces of a preplasticized mixture as large as a hand are torn off which

drop into vessels arranged below the milling machine. This operation may be continued as long as desired, if the correct temperature of the rollers is maintained by suitable cooling e. g. by means of water. Evidently a somewhat higher compressing pressure acts in the middle of the gap formed between the pair of rollers, because the continuously added fresh quantity of raw material combines with the hot particles of the sheet or skin practically directly after being supplied. Hereby all particles of the sheet or skin are forced towards the small severing or stripping off knives in substantial helical paths. The particles of the mass hereby are repeatedly conveyed to the gap formed between the pair of rollers but always to other points, whereby they are intimately mixed and compressed until finally they reach the ends of the rollers. The raw mixture supplied to the rollers cannot fall through the gap formed between the pair of rollers, because the later always is closed by the slight excess of plastic material. An undue lateral mixing in the gap formed between the pair of rollers cannot occur, because, compared with the total amount of the plastic mass forming the sheet or skin, the quantity of plastic mass present in said gap is small. Preferably about 10-30% only of the total amount of plastic mass upon the roller are present in the gap formed between the pair of rollers. If this percentage exceeds 50% an operation free of objection will be rendered impossible, because then at the final mixing particles of unplasticized raw mixture are found to be admixed.

To carry out the new method the same prescriptions may generally be used which are employed for discontinuously rolling corresponding mixtures. The gap formed between the pair of rollers preferably has about the same width or may be somewhat wider as has been proved favorably in ordinary practise. The width may vary between 0.5-7 mm, preferably 1-5 mm. As usual prescription the following may be mentioned: Artificial resin quick press masses: 40-45% of a mixture of 85p. Novalak resin (i. e. condensation products phenol-formaldehyde, which are soluble and can not be hardened)—and 15 p. hexa-methylene-tetramine—55-40% wood meal, 2% stearic acid, 1% magnesium oxyde, 2% dye-stuffs. Rubber mixture: 200p. rubber, 210p. chalk, 15p. antimony pentasulfide, 4p. burnt magnesia, 4p. sulfur, 2p. stearic acid, 1.6p. ultra accelerators. In some cases, i. e. if the mass too strongly adheres to the supporting roller, it is advisable to somewhat increase the quantity of lubricating material present in the prescription or to somewhat reduce the temperature of the supporting roller. Rather small deviations come into consideration here and it is to be observed that according to the new method a certain adherence of the sheet or skin on the supporting roller is necessary for an operation free of objections, because otherwise the sheet or skin does not lie smoothly upon the roller, but tends to form bubbles and to strongly tear up. When producing masses containing volatile constituents, for instance quick press masses based on phenol-formaldehyde resin or cresol-formaldehyde resin and wood meal, a special tension for the formation of bubbles exists, and if in such a case the above mentioned arrangement of most simple construction would be employed it would not be possible to remove a press mass free from raw mixture, because the steam bubbles developed from the wet wood meal would be compressed in the gap formed between the pair of rollers and finally would burst and thereby spread

the pulverized raw mixture in form of dust about the entire milling machine. It has, therefore, proved necessary in this case to provide simple auxiliary devices—at least one—near the vertex line of the supporting roller which auxiliary devices are used for slitting the skin or sheet so that larger steam bubbles cannot accumulate. The tools necessary for this purpose are shown in the accompanying drawing. Preferably two tools are fixed at a traverse in such a manner that they are pressed against the supporting roller by their own weight as well as by the resistance offered by them to the sheet or skin to be cut. The tools preferably consist of steel so that the cutting edge provided to slit the skin or sheet slowly wears off only. Besides the cutting edge for cutting the sheet or skin they still carry, as may be seen from the drawing Fig. 5, two inclined surfaces extending from the lower side to the right and left and which prevent the slit sheet or skin from being forced back again in the same position in the gap formed between the pair of rollers. The edges of the sheet or skin thereby are bent upwardly about 10-15 mm vertically to the upper surface of the roller, whereby with regard to the most simple construction according to the invention, the mixing effect is considerably increased. The more knives or similar tools are used, the more surely a uniform mixing and treating of the mass is ensured. It is, however, to be observed that in any case it is unsuitable to choose broader knives than necessary, because hereby the free passage of the sheet or skin between the knives is hindered, obstructions may occur or the sheet or skin may be thrown off the roller. The free cross section of the passage between the knives preferably at least must be as large as the cross section blocked by the knives.

If pulverized raw materials are used, a uniform raw mixture is produced first of all and a vibrating charging device, for instance as used in milling industries, is employed as charging device. Liquid or sirupy raw materials may be supplied by means of a supply valve. If simultaneously raw materials of different condition of aggregation are to be employed or if special effects are desired, the operation may be carried out with the simultaneous use of a plurality of charging devices which supply the raw materials either in close proximity to each other or at points spaced in larger distances. For the manufacture of artificial resin quick press masses the device shown in the drawing Fig. 3 has been proved of advantage as removal device. The latter consists in elastic pressing against the roller a number of plates *g* preferably of steel of a thickness of preferably about 1 mm which are rotatably mounted upon a shaft *i* and are spaced preferably about 8 mm from each other and between which spacing discs are interposed. A fixed comb *h* cooperates with the rotatable steel discs. The parts of the sheet or skin coming into the range of the steel discs are severed from the sheet or skin and pressed into the intermediate spaces between the discs. By the frictional transmission the discs are rotated and carry upwardly the masses pinched in between them until the particles of the mass finally abut against the comb, whereby they continuously are removed from the intermediate spaces and fall into the channel *m*. In this manner the material not only is obtained in sufficient quantity, but also small strips and pieces respectively are obtained which are very well

adapted to be cooled with air in other devices and to be ground.

Instead of the charging devices mentioned above, any desired other charging and removal device may be used which allows a continuous supply of raw material or a continuous removal of final articles respectively. In connection with the removal device it is to be observed that, with masses having a relatively small adherence on the roller, care is to be taken that the removal devices are not allowed to cause dropping of the sheet or skin. Therefore, if fixed knives for instance are used, the latter must be sharply ground. Instead of the arrangement shown in the accompanying drawing, the supply device may also be mounted at one end of the milling machine. The arrangement shown, however, is to be preferred.

The masses which may be produced according to the invention are in any case at least as good as masses of equal composition treated upon discontinuously operating calenders provided with two rollers, but are superior to the latter as far as uniformity of the obtained material is concerned. Owing to the small quantities of plastic masses present at a time upon the milling machine, the mass treated according to the present method need be heated a relatively short period of time only. For this reason the new method is particularly in point, if the mixture to be produced, when being heated, has the property of changing by chemical reaction unfavorably for further treatment. These conditions strongly prevail in the manufacture of quick press mixtures based on phenol-formaldehyde resins, cresol-formaldehyde resins, urea-formaldehyde resins, phenol-furfurol resins and similar mixtures which are adapted to be hardened in heated press-molds and to be converted into final articles. Similar conditions prevail in the production of rubber mixtures particularly when operating with ultra-accelerators. The method, however, has also advantages in the production of thermo-plastic masses based for instance upon polyvinyl-chloride, polyacryl-acid ester and cellulose acetate.

Known devices may be arranged behind the device according to the invention. For instance discontinuously operating milling machines, calenders, cable presses, cable-winding machines, string presses, tubing machines, cutting machines, painting machines, vulcanizing presses, artificial resin presses and generally machines for producing or further treating plastic masses may be mentioned. One or more such known devices may be arranged in such a way.

Example

An ordinary milling machine provided with two rollers each of a diameter of 400 mm and a useful length of 1100 mm the supporting roller of which performs 18 revolutions per minute, whereas the counter roller performs 21 revolutions per minute, was provided with the devices according to Figs. 2 and 3 after the severing or stripping off knife extending over the total width of the rollers had been removed. Above the supply channel shown, a shaking or vibrating charging device

was mounted. After a sheet or skin had been formed in the usual manner, the supply container of the shaking or vibrating charger was filled with an intimate mixture of the pulverized raw materials for producing 50% quick press mass based on a phenol-formaldehyde-wood meal and brought to action. The gap formed between the pair of rollers had a width of 2,5 mm. The temperatures of the rollers were so adjusted that the sheet or skin roller had a temperature of 90° and the counter roller a temperature of 60°. After a very short period of time finished press mass in the form of strips of a width of 8 mm was removed. For maintaining a stationary state, the roller supporting the sheet or skin was strongly cooled by cooling water, whereas the counter roller was moderately cooled only in the same way. It was found that a uniform production with an output of finished quick press mass of 150 kg per hour in form of strips of any desired length could be maintained. The strength of the electric current consumed was nearly uniformly 100 amperes and never exceeded 110 amperes. The same milling machine discontinuously operating in the known manner resulted in a output of finished press mass of 40 kg per hour in the form of unmanageable sheets or skins and shows a strongly fluctuating electric current consumption reaching peaks of 200 amperes. The press mass obtained according to the invention was, as far as the technical press properties are concerned, equal to the press mass produced according to known methods, was, however, superior to the latter as far as uniformity of the obtained mass is concerned.

In the annexed drawing Fig. 1 is a front view of a calender provided with two rollers, Fig. 2 the same in cross section, viz. side view, Fig. 3 a removal device with stripping off comb, Fig. 4 a double tool in working position for slitting the skin, Fig. 5 a section through the steel cutting edges of the tools.

a designates the supporting roller on which the skin is carried, *b* is a traverse, *c* a charging device, *d* double tools which are shiftable on the traverse and removable by being lifted upwardly, *e* steel cutting edges, *f* a removal device, *g* steel discs of 1 mm, *h* a stripping off comb, *i* a shaft, *k* bifurcated level rotatable around the traverse *b* carrying the shaft *i* and the taking off device *f*, *l* a tension spring pressing the taking off device, *m* the channel, *n* the skin, *o* parts of the skin viz. strips.

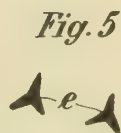
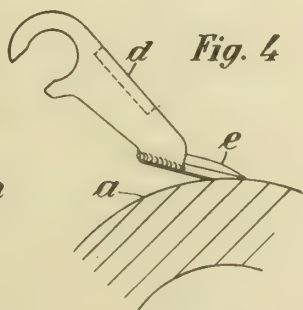
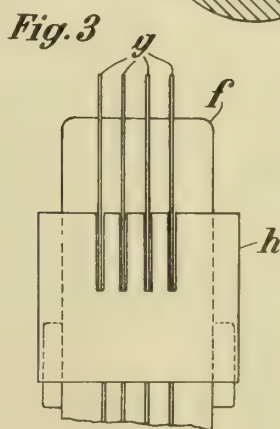
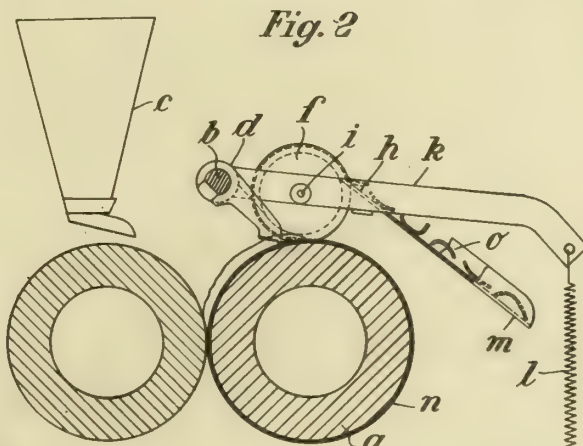
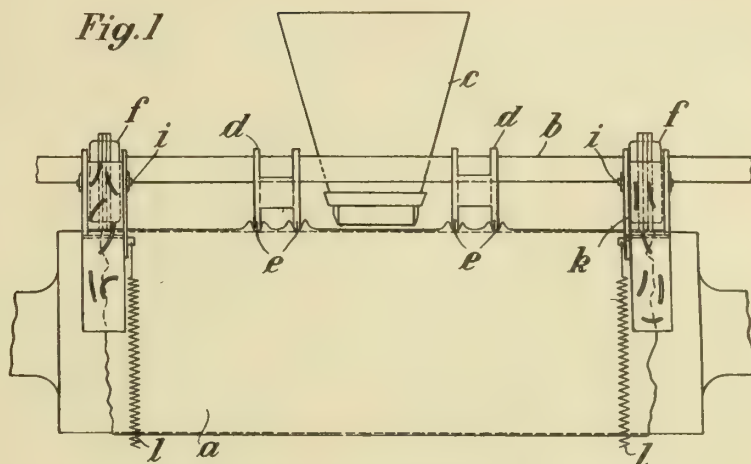
To sum up: According to the invention plastic masses are continuously produced on a calender provided with two rollers by adding raw materials and removing the produced mass at spaced annular zones respectively and only such a quantity of raw material is added that 50% at the most of the total mass upon the mixing mill are present in the gap. The spaces may be differently chosen but preferably charging as carried out in the middle and the removal at both ends of the supporting roller. The apparatus for carrying out the invention chiefly consists in two rollers and at least one charging and at least one, preferably two removal devices.

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ALIEN PROPERTY CUSTODIAN

SYSTEMS AND DEVICES FOR TEMPERING HOLLOW GLASS ARTICLES

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This invention refers to improvements in the tempering of hollow glass articles, with a sudden cooling of said articles by blowing jets of air or other fluid against the surfaces of same.

The invention generally refers to all kind glass of articles for any use, for inst. drink glasses, bottles, vases, tubes, globes, and other recipients, as bombs, having walls of any thickness and of variable thickness.

Particularly the invention refers to articles having relatively thin walls.

The above said kinds of glass articles have been tempered up to day, preferably by immersing them, immediately after they have been extracted from the forms and when they have still a high temperature, in an oil or melted salt bath. This tempering system diminishes the brilliancy of the glass. Further, articles having relatively thin walls may not be tempered with this system. If the walls of the articles are not uniformly thick, then the tempering by immersion is not uniform and this prejudices the elasticity and the resistance of the tempered article.

All these drawbacks become eliminated by the improvements in the tempering system and devices according to this invention.

A first feature of the invention consisting in the fact that the article to be tempered becomes previously slowly heated in a manner to bring all its parts to a temperature adapted for a good tempering. In a particular manner, an article having walls of variable thickness will be heated proportional to its different thicknesses so that a perfect uniformity of temperature of all parts of the object is obtained.

According to another feature of the invention, articles having particularly relatively thin walls, become tempered very rapidly, for inst. within 5-10 seconds, with high pressure jets of air or other fluid, for inst. 7-8 atm. issued by nozzles placed at a little distance, 3-5 mm, from the walls of the article.

According to another feature of the invention the inner faces of an object become tempered in a different manner than the outer faces of same. Precisely the inner faces, for inst., of a drink glass, become tempered more rapidly than the outer faces of same, so that the so-called "core", which is formed between the suddenly cooled outer layers of the walls, will be displaced towards the interior of the object. An object which is tempered in this manner will be more resistant at the outer faces, against which the shocks are more frequent, than at the inner faces.

Since in order to obtain a good tempering ef-

fect the object must be heated to a temperature which is near the softening point of the glass, it is provided, according to another feature of this invention, to keep still the object during tempering, so that it may not become deformed and it is further provided, according to this invention to move the blowing elements so as to obtain the rapid and uniform distribution of the jets over the whole internal and external surface of the object being tempered.

It is, however, possible to keep still also the blowing elements and in this case the latter are distributed over the whole inner and outer surfaces of the object to be tempered.

In some cases where the shape of the object does not allow the blowing elements of being thus distributed as to follow perfectly said shape, for inst. in the case of bottles, the inner blowing elements only may be moved, and may blow with a pressure different from that of the outer blowing elements, in order to compensate the greater distance of the nozzles, and their less number, with respect of the outer elements.

These and other features particularly that referring to the devices for carrying out the invention, will be better understood from the following description of some examples of these devices, which are shown in the annexed drawings:

Fig. 1 is a longitudinal middle section of a drink glass, in which the different layers created by the tempering process are shown, in which the inner layer, or so-called "core", is displaced towards the interior of the glass.

Fig. 2 shows a first type of a tempering device according to this invention, in which both the inner and outer blowing elements are stationary; and whereby the outer element is of the type like an openable form;

Fig. 3 is the plant view of same;

Fig. 4 shows a supporting ring for the object during tempering;

Fig. 5 shows a second type of tempering device, according to this invention, in which both the inner and outer blowing elements become moved, either with a simple rotating movement, or with a combined rotating and alternated axial movement;

Fig. 6 is the corresponding plant view;

Fig. 7 shows the path described by each jet blown by the elements according to Fig. 5;

Fig. 8 shows still another tempering device according to this invention;

Fig. 9 is the corresponding plant view;

Figs. 10 and 11 show a type of a heating chamber with a heating element for a drink glass;

Fig. 12 shows a similar heating chamber with a heating element for a bottle;

Figs. 13 and 13a show, schematically, a complete machine for heating and tempering continuously;

Fig. 1 is intended to show, how the inner layer or so-called "core" which becomes formed the outer layers of the glass wall which have been suddenly cooled, is displaced towards the interior of the object. This displacement of the core has been obtained by a more rapid tempering of the inner faces of the object, with respect of its outer faces, with the purpose of rendering the outer faces more resisting than the inner faces.

Figures 2 and 3 show a first type of tempering device, for tempering a drink glass.

The glass A is supported by a supporting ring a, having radial projections b and is held by vertical projections c of said ring. The ring a is collocated on a fixed plan d of the device, by means of externally extending projections e and pins f provided on said fixed plan, which serve to keep centred the supporting ring a with respect of the blowing elements.

The inner blowing element is consisting of a cylindrical element g provided with holes h; the outer blowing element i has form of an open cylinder, which surrounds the object to be tempered, and which is provided with holes k. It is consisting of two parts which are hinged together at l so that it may be easily opened and closed.

A third blowing element m is arranged on the fixed table d, beneath the supporting ring a.

As will be clearly seen from the figures, the form and the arrangement of the three blowing elements is such as to blow jets of air, or other fluid, against the whole inner and outer surface of the object to be tempered and as the holes, through which the jets are blown, may be arranged sufficiently close to one another, practically the whole surface of the object will be invested by the air.

The various blowing elements may be connected all with the same compressed air source or ventilator, in order that the pressure of the jets is the same, or they may be controlled so as to blow air or fluid under different or variable pressure, if different thicknesses are to be tempered, or if, owing to the shape of the object the distance of some points of the object from the blowing holes is different, or if for the above specified reason, or for any other reason, one or two blowers should blow with a different pressure and/or for a different period of time with respect of the other or the others.

The supporting ring a bears a further projection n which may serve to hold and transport it from the heating chamber to the tempering device, which transport may effected either by hand or mechanically, for inst. in a machine for continuous heating and tempering.

These different tempering can also be obtained by varying the number of the blowing holes or by varying their diameter.

The radial projections b which serve to support the object to be tempered, may be connected together by metallic wires, and a net of wires may be foreseen so as to leave decorative or inscriptive incisions in the bottom of the object.

The tempering device according to Fig. 4 is essentially consisting of a hollow shaft 2, mounted in special supports 3, allowing it to rotate and to move axially. The shaft 2 bears a body 1, from which are departing arms 4 and 5, some of

which extend in the interior and the other at the exterior of the object to be tempered. Said arms are provided with blowing holes 6 and 7 along their sides towards the faces of the object A and they are shaped so as to follow the shape of the object A. The glass A is supported on a supporting ring 8, the surface of which is consisting of a net of thin wires and which presents perimetral upward projections 9 to hold the glass A. A hollow disc 12 is provided with holes 10 and is communicating with shaft 11.

Shafts 2 and 11 are connected to the compressed air source or to the ventilator.

By means of adapted driving and transmission means, the shaft 2 is rotated and alternately axially moved, so that the jets issued by holes 6 and 7 describe paths, as shown by Fig. 7.

Figs. 9 and 9 show still another tempering device according to this invention.

27 is a sucking tube placed in the interior of the blowing element 28. The latter presents a distributing body 29, from which elements 30 are extending downwardly, which are provided with blowing holes directed against the outer faces of the object to be tempered, and an element 31, which is provided with holes directed against the inner faces of the object.

As will be seen from Fig. 8, the blowing holes are more close to one another at the upper part of the object 1, where this has thinner walls, than at the under part where it has thicker walls and where, therefore, a less efficacious tempering is required.

The bottom of the object 1 becomes tempered by jets blown through holes of element 14.

The glass A is supported by needles 21 placed on a fixed frame of the device.

The tube 32 is connected to tube 27, and with its head 33 sucks the air issued by the internal blowing holes.

In order to obtain an efficacious tempering especially on the border 36 of the glass, a sucking ring 35 is placed near it, which is also connected to tube 27, through pipes 34.

Figures 10, 11 illustrate a type of heating device, according to this invention.

The glass A is held by a support 37 mounted on shaft 38. In the interior of the glass, the heating element 39 is arranged which is preferably of the type heated by an electric resistance and which is held by shaft 40. 41 are the walls of the heating chamber, made of refractory material, which presents slits 42 and 43, through and along which the shafts 38 and 40 may be moved with a synchron movement. This movement is transmitted to said shafts by means of chains 44 and 45, with which the shafts 38 and 40 are engaged respectively.

Shaft 40 bears two contact springs 46 sliding, during the movement, upon contact guides 47 through which the current is led to the heating element 39.

Shaft 38 bears a toothed wheel 48 engages with chain 49 so as to impart the shaft 38 a slow rotating movement in order to assure uniform heating of the glass A.

The heating element 39 presents an upper annular expansion 50 surrounding the upper border of the glass A. This expansion can also be executed to extend downward so as to surround the whole outer face of glass A.

Fig. 12 shows a heating chamber with a heating element 68 adapted for heating a bottle. The bottle 66 is supported by support 67 which receives a transporting movement from chain 44

and a slow rotating movement from wheel 48, as described.

The heating element has an annular expansion 69 which serves to heat the top 70 of the bottle, which is normally thicker than the other walls.

Figures 13, 13a show an example of a complete machine for heating and tempering continuously.

The chain 44 which serves to transport the objects to be tempered, is mounted on polygonal wheels 85, which are rotated about their axis 86. The length of each sector of wheels 85 corresponds to the length of each element of chain 44. At the pivot points of the chain elements there are fixed the shafts 38 supporting the objects to be tempered.

A chain 45 running on wheels 87, mounted on axis 88 bears and transports likewise the heating elements 39. Chain 44 is guided by rollers 89. Similar guiding rollers 89 are provided for chain 45. The elements of both chains 44 and 45 have the same length.

Chains 111 arranged inside the chains 44 and 45 and serve to maintain the exact vertical position of the shafts bearing the objects to be tempered and the heating elements respectively. Said chains 111 are running over polygonal wheels 90 mounted on axis 91, respectively 91' and 92. Of course, chains 44, 45 and 111 must be moved with synchronism so as to assure exact position of the objects to be tempered with respect of the heating elements. The shafts supporting the objects are provided with counterweights 112 serving to assure the vertical position of said shafts, the ends of which are engaged with chain 111.

It is clear that with such an arrangement, a continuous heating may be obtained by transporting the objects through a heating chamber as already described. 94 indicates the pavement of the room where the machine is placed.

The device for tempering continuously is illustrated in the right part 23a of the figure. On the frame 95, preferably made of refractory ma-

terial, is slidable mounted a plan 96 to which an alternating movement is imparted by means of excenters 97, mounted on axis 98, the actuating mechanism of which is not shown. On plan 96 an electric motor 99 is placed, which through shafts 100 and gears 101 actuates a rod 102, terminating on a guide element 103, on which a box 104 is mounted.

The highness of the movement imparted to plane 96 by excenters 97 is such as to raise the blowing elements completely above the objects to be tempered.

If for inst. the tempering device allows four objects be tempered simultaneously, then the wheels 85 must moved so as to bring this number of shafts 38 at a time beneath the tempering device.

The movement imparted to box 104, by rods 102 has the purpose of uniforming the tempering effect. Box 104 is divided into two parts; the upper part is connect to pipe 105, for inst. for sucking, and the under part is connected to pipe 106 feeding the compressed air or fluid to be blown. The blowing and sucking elements are connected to the respective parts of the box so as to allow rotation of the elements. This rotating movement is given by motor 108, mounted on a support 107, through a shaft 109 and gears 110.

The left side of frame 95 terminates close to the extremity of the heating chamber. This extremity is closed by a door 113 connected to the box 104.

The manner of working of this machine is clear and needs not particularly to be described.

After having tempered by blowing air or fluid the object can also be thrown in a liquid bath to complete the tempering.

In particular cases, as for inst. in case of bombs, it may be provided to temper the bomb only along predetermined lines or zones, in order to obtain determined lines or zones of resistance and other zones or lines of fracture, which effects may easily be obtained by controlling accordingly the blowing or sucking elements.

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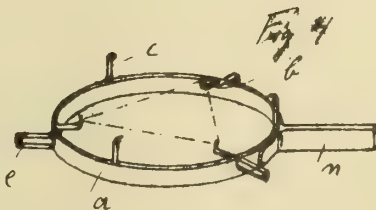
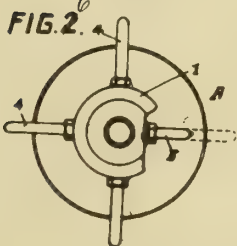
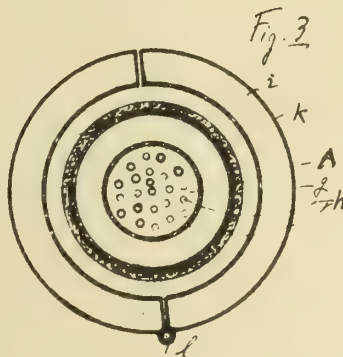
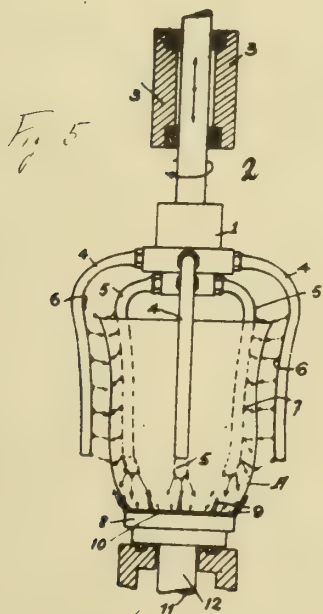
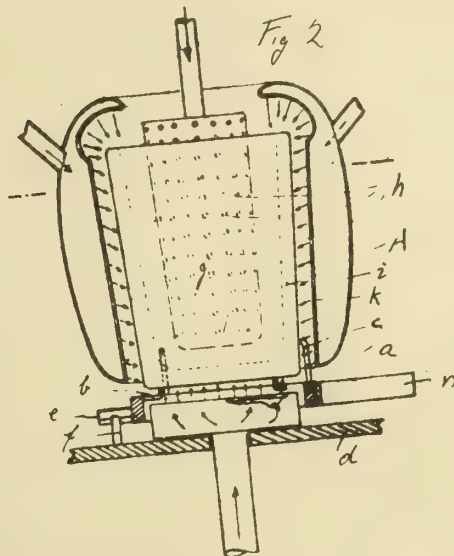
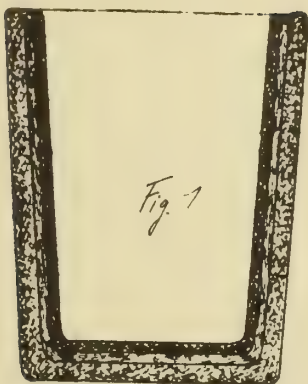
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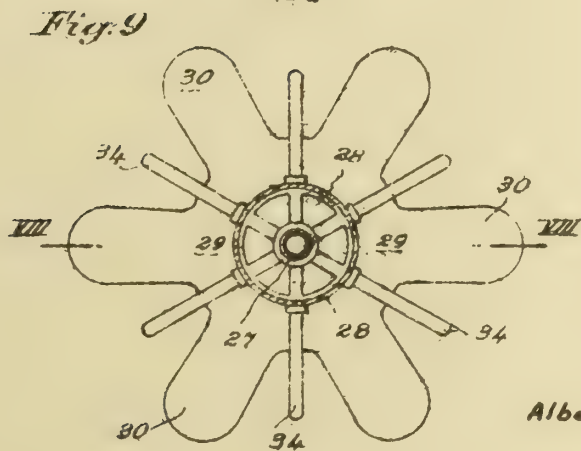
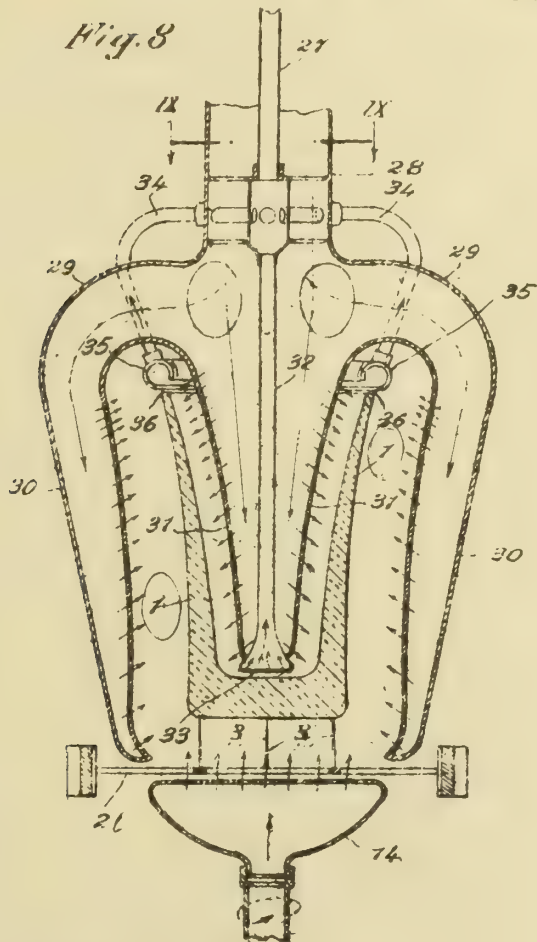
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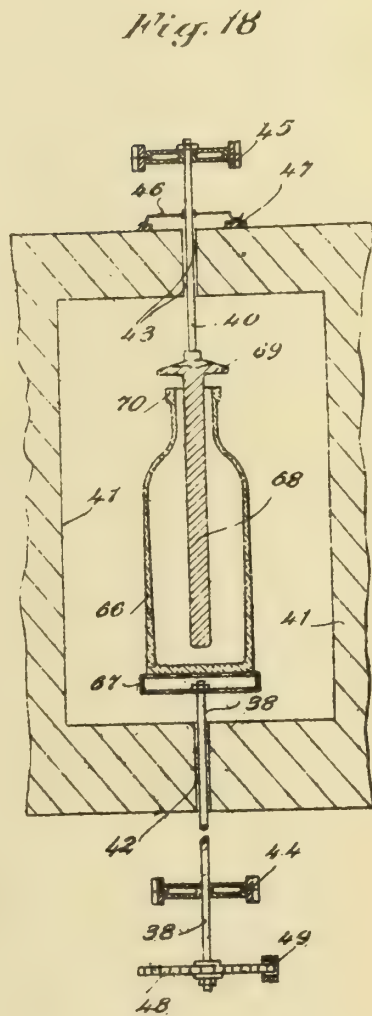
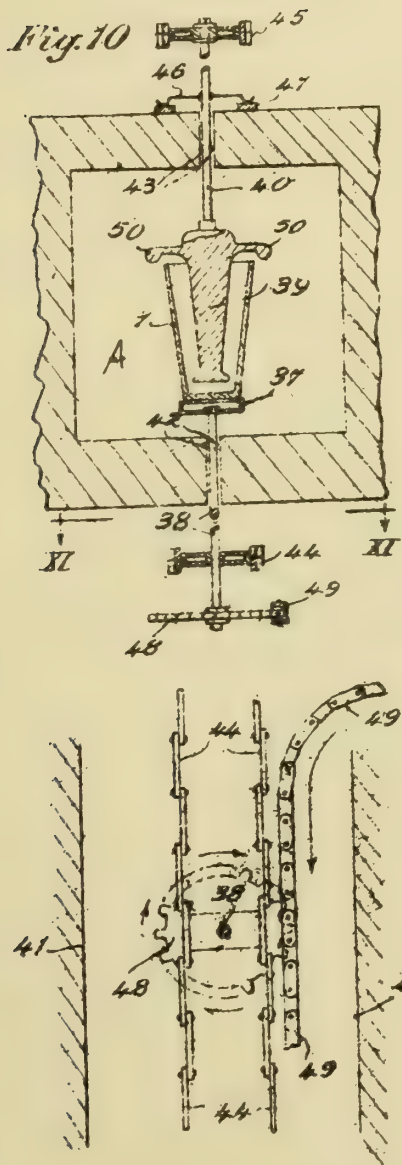
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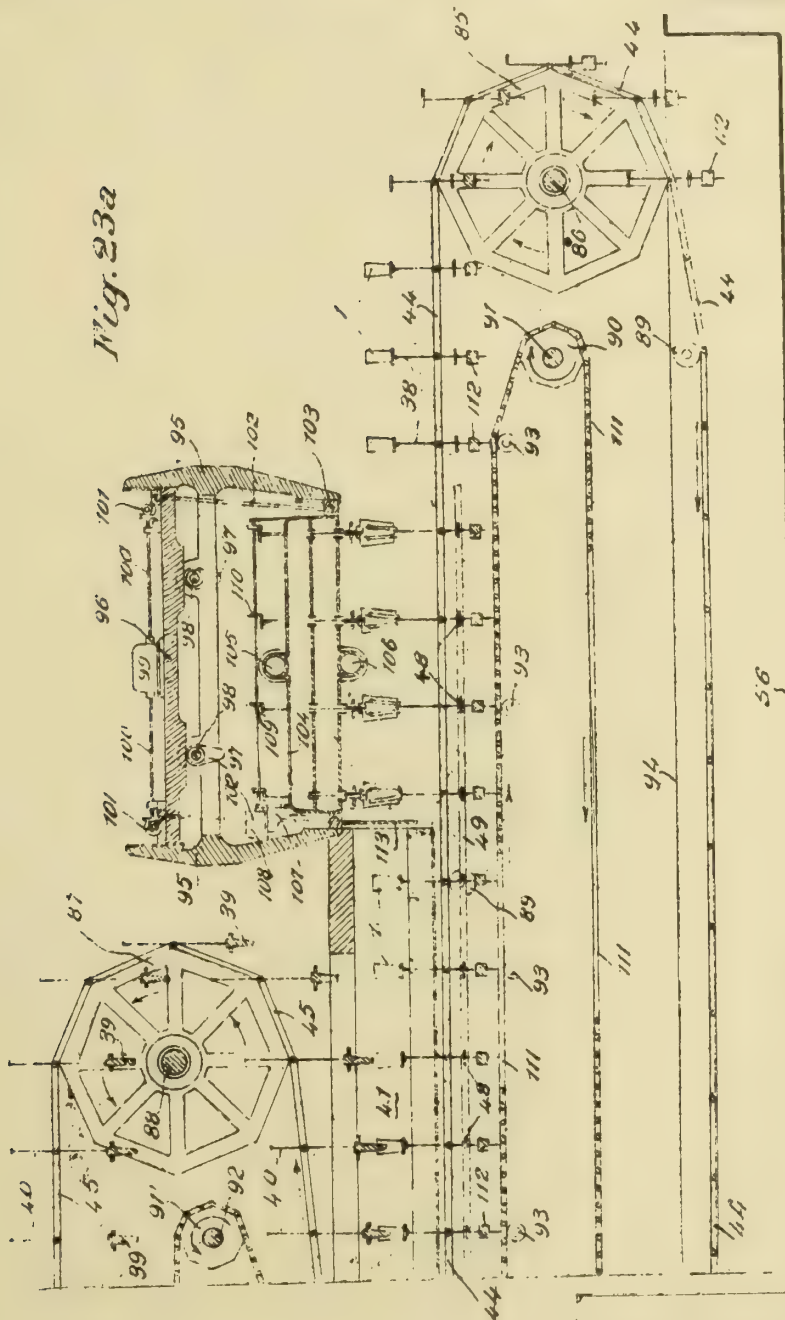
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A. QUENTIN
SYSTEMS AND DEVICES FOR TEMPERING
HOLLOW GLASS ARTICLES
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5 Sheets-Sheet 4

Fig. 23a



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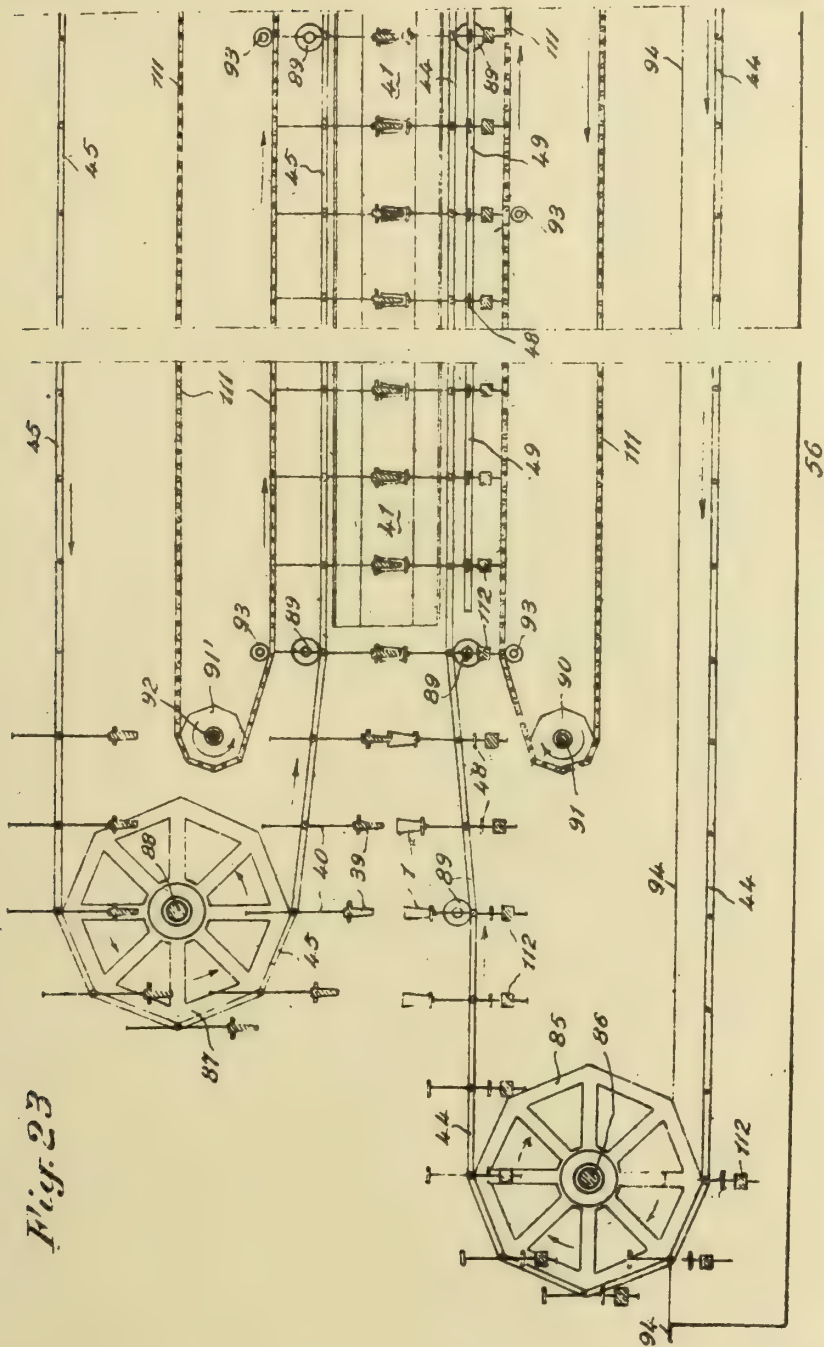
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A. QUENTIN
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314,727

5 Sheets-Sheet 5



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ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE MANUFACTURE OF
FIBRES, FILAMENTS, THREADS, FILMS
AND THE LIKE FROM SOLUTIONS OF
PROTEINS, PARTICULARLY CASEIN

Maria Gesina Ter Horst, Amsterdam, Holland;
vested in the Alien Property Custodian

Application filed January 20, 1940

For the manufacture of fibres, filaments, threads, films and the like from solutions of proteins, particularly casein, the protein is dissolved in diluted alkali at temperatures below 30° C, whereupon the solution is aged some time, during which aging time a remarkable increase of the viscosity occurs and after that the solution is spun in an acid spinning bath in a manner known per se.

This increase of the viscosity by the aging is considered to be of great importance, since a suitable viscosity is desirable for an exact proceeding of the spinning process. This is the reason why several more or less efficient measures for regulating or keeping constant the viscosity are mentioned. In this connection the literature also mentions variations of the alkalinity. According to the invention it has appeared that the alkalinity of the spinning solution, also for other reasons, is very important, viz. particularly an alkalinity range, in which, to some extent, the alkalinity runs counter to the easy dissolving of the protein.

In order to elucidate this further, it is first necessary to give an exact definition of which has to be understood by the alkalinity of a protein solution, because the composition of e. g. a casein solution is not sufficiently defined by indicating the amounts of casein and alkali used, since it is necessary to mention thereby the acidity or preferably the acid number (i. e. the number of cm³ N/10 NaOH necessary for neutralising 1 g casein with phenolphthalein as an indicator) of the casein used. For this acid number depends on the manner in which the protein, particularly the casein, is precipitated, viz. in such a manner that the acid number of the protein increases as the pH prevailing during the precipitation decreases.

The annexed drawing shows a diagram indicating by way of example this relation between acid number and pH for casein. The hatched area contains a very large number of points being determined experimentally. This relation is not represented by a single line, since mostly small deviations of a straight line are found in consequence of incidental and periodical variations of the buffer value of milk.

Therefore, speaking about an amount alkali to be used for dissolving, this amount has to be split up into a part being necessary for neutralising the protein and an excess, hereinafter called "free alkali", which in reality represents the alkali content of the solution. Starting e. g. from the so-called "textile casein", having an acid

number of approximately 10.5 and using for 100 kg dry casein 9.56 kg NaOH to obtain a solution of 17%, there will be approximately 0.91% free NaOH; using 7.73 kg NaOH, there will be approximately 0.60% free NaOH (or 0.88 mol/kg casein).

In case with a view to more easy dissolution of the protein, such as casein, a method is used, in which at first a part of the water is retained in order to add this later on for obtaining the desired concentration, even a very much higher percentage free alkali will temporarily be present.

It is known that an extreme excess NaOH strongly decomposes protein material, such as casein, so that it is impossible to spin such solutions. Nor does applicant aim at solutions having a content of free NaOH of 0.6–0.9% and higher or a corresponding content of KOH or alkali mixtures, with which it is possible to operate fairly well and to obtain good results.

According to the invention, however, it is found that the range of contents of free NaOH being much lower than 0.6%, offers great advantages for the spinning. For it has appeared that by decreasing the content of free alkali to below 0.5% or preferably below 0.3%, with for the rest the same method a textile product having in general a remarkably better quality is obtained, particularly with a view to the strength which by a decrease of the content of free alkali from 0.5% to 0.2% showed an improvement of 15–20%. Also other properties, such as the resistance to boiling, are improved. This improvement is lasting by lowering the content of free alkali below 0.1%, even as much that no more free alkali is present or even a deficiency in bound alkali occurs.

Though in general protein solutions by the aging tend to become still more viscous till coagulation occurs, this tendency appears to be already very small for 0.2% of free alkali and for 0.1% of free alkali the remarkable phenomenon occurs that the viscosity decreases during the aging, as the following table shows.

| Free NaOH | After 3 hours | After 12 hours | After 22 hours | After 48 hours |
|-------------|---------------|----------------|----------------|----------------|
| +0.2% ----- | 53 | 66 | 66 | 65 |
| +0.1% ----- | 95 | 72 | 62 | 43 |
| 0.0% ----- | 188 | 72 | 47 | 22 |

Though it is true that solutions having a very low content of free alkali or even a deficiency in bound alkali, sometimes can be prepared and treated less easily than those with a very much

higher content of alkali, this partly depending from the protein used (which rather causes differences of the viscosity), according to the invention this can be met by suitable measures. In case e. g. operating with protein solutions containing 0.1% or less of free alkali would cause difficulties by the high starting viscosity, these difficulties can be overcome by adding to the solution small amounts of a substance having no or an extremely weak alkaline reaction and which in large amounts can dissolve protein being not neutralised, e. g. urea, thiourea and the like. E. g. the viscosity of a casein solution containing only 0.05% or less of free alkali, will be lowered to half its value or less by addition of 1-5% of urea.

If, therefore, a content of free alkali below 0.1% or even a deficiency in bound alkali, that is to say, if proteins being neutralised incompletely, have to be dissolved, would cause difficulties, the use of these substances being not or extremely weakly alkaline is a suitable manner of meeting the difficulties. The possibility of the growth of bacteria, however, increases, but this can be met in the ordinary manner by using one of the many preserving means, e. g. thymol, phenol, cresol, β -naphthol, hypochloric salts, salicylic aldehyde, salts of heavy metals, etc.

The solutions may also be pasteurised or sterilised immediately after their preparation, which preferably is carried out by momentaneous heating. It is a particular property of these casein solutions with a low alkali content that they can withstand this, since by this operation the solutions having a higher alkali content become unsuitable or less suitable for spinning purposes, probably by hydrolysis of the casein.

These protein solutions having a very low content of free alkali offer also in an other connection an important advantage, because practically they can be spun without aging. In case protein having a very low ash content, in which form e. g. casein can be obtained, is used hereby the solution with a very low content of free alkali or even lacking in bound alkali has a lower starting viscosity than solutions of proteins containing more ash.

The protein solutions according to the invention having a very low content of free alkali or even lacking in bound alkali, also cause difficulties by the filtration as a consequence of their high starting viscosity. As a matter of fact the protein solutions having a rather high free alkali content have a rather low starting viscosity which, however, increases during the aging, as the following table shows.

| Per cent free NaOH | 3 hours | 12 hours | 22 hours | 46 hours |
|--------------------|---------|----------|----------|----------|
| +0.9 | 8 | 12 | 12 | 16 |
| +0.6 | 12 | 17 | 17 | 21 |
| +0.4 | 23 | 32 | 31 | 36 |
| +0.3 | 29 | 38 | 39 | 41 |
| +0.2 | 53 | 66 | 66 | 65 |
| +0.1 | 95 | 72 | 62 | 43 |
| +0.0 | 188 | 72 | 47 | 22 |
| -0.1 | (1) | (1) | 60 | 43 |
| -0.2 | (1) | (1) | 83 | 58 |

¹ Too viscous.

According to the invention it has been found further that spinning solutions having a low alkali content are very well resistant to increased temperatures, so that their viscosity can be sufficiently decreased by heating, in order to obtain solutions which can easily be filtered. The remarkable fact thereby is that the heating has

only a very small influence on the starting viscosity, but that the starting viscosity lasts longer. This is clearly shown by the following table, which relates to spinning solutions prepared from two samples of casein, one part of the solutions having been kept at 25° C and another part having been first heated at 80° C during some time and thereupon having been kept also at 25° C. The viscosity was determined with the falling sphere viscosimeter at several times after the preparation.

| Sample | Temp. | 1 day | 2 days | 3 days | 5 days | 6 days |
|---------|---------|-------|--------|--------|--------|--------|
| | Degrees | | | | | |
| B.----- | 25 | 62 | 21 | 10 | 2 | 1 |
| B.----- | 80 | 63 | 65 | 64 | 45 | 42 |
| C.----- | 25 | 25 | 10 | 4 | 1 | 1 |
| C.----- | 80 | 34 | 35 | 37 | 28 | 25 |

It has been found that the duration of the heating may vary between some minutes and some hours and that the temperature may be increased to at least 60° C, preferably, however, to a temperature above 80° C. The surprising fact is that the spinning solutions according to the invention are not coagulated and/or decomposed at the high temperatures, such in contradistinction to the spinning solutions having a high content of free alkali.

By way of example, but not as a limitation of the invention, the following examples are given.

Example 1

(a) 100 kg spinning solution is prepared from 16.7 kg of casein (dry matter content 95.6%, acid number 8.7), 81.9 kg of water, 0.382 kg of NaOH and 1.0 kg of urea.

16% casein
1% urea
-0.2% free alkali
or 0.3 mol./Kg casein } viscosity=18.

(b) 100 kg spinning solution is prepared from 16.7 kg of the same casein, 82.9 kg of water and 0.382 kg of NaOH.

16% casein
-0.2 free alkali } viscosity=24.

Example 2

(b) 100 kg spinning solution are prepared from 16.7 kg of casein (dry matter content 95.6%, acid number 8.7), 82.5 kg of water and 0.782 kg of NaOH.

16% casein
+0.2% free alkali
or +0.3 mol./Kg casein } viscosity=29.

(b) 100 kg spinning solution are prepared from 16.7 kg of casein of the same casein, 79.5 kg of water, 0.782 kg of NaOH and 3 kg of urea.

16% casein
+0.2% free alkali
3% urea } viscosity=9.

These viscosities are determined with the falling sphere viscosimeter.

Obviously the invention is not limited to the examples given, but the data mentioned may vary according to the circumstances, particularly there exist several substances having a dissolving action and satisfying the exigencies.

Various changes may be made in the details disclosed in the foregoing specification without departing from the invention or sacrificing the advantages thereof.

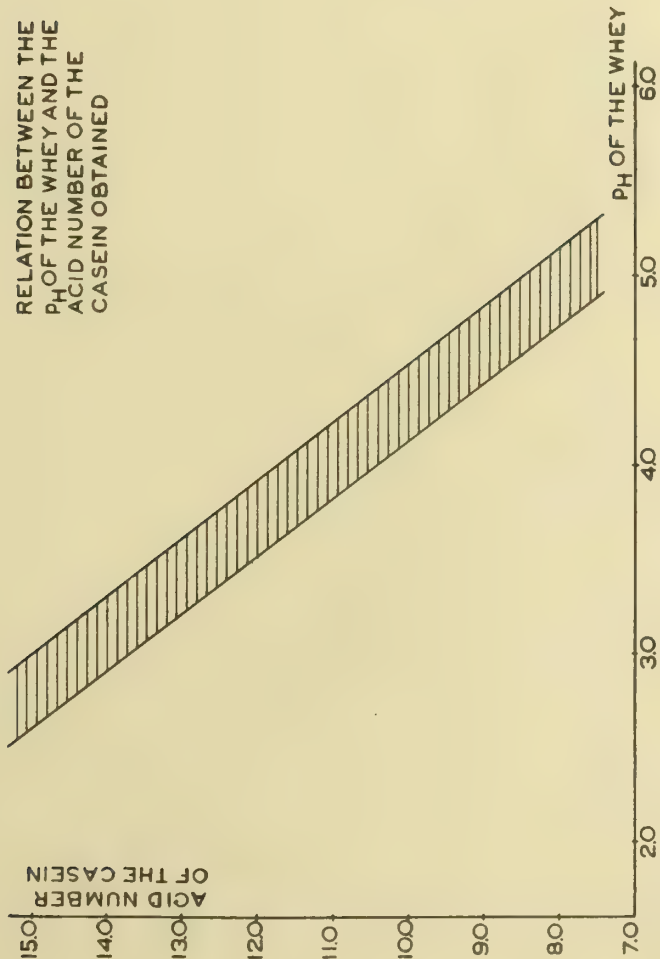
MARIA GESINA TER HORST.

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BY A. P. C.

M. G. TER HORST
PROCESS FOR THE MANUFACTURE OF FIBRES,
FILAMENTS, THREADS, FILMS AND THE LIKE
FROM SOLUTIONS OF PROTEINS,
PARTICULARLY CASEIN
Filed Jan. 20, 1940

Serial No.
314,880



Inventor:
M. G. Ter Horst,
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Att'y

ALIEN PROPERTY CUSTODIAN

SHIPS' LIFEBOATS

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in the Alien Property Custodian

Application filed January 22, 1940

This invention relates to a boat-launching device with luffing davits or the like arranged within the length of the boat, the arms of the davits, in the in-board position of the boat and of the davits, fitting closely to the cross-sectional form of the boat. The sides of these arms facing the boat have hitherto been shaped parallel to the longitudinal axis of the boat.

The invention consists in the feature that the davit arms, at the side facing the boat, fit snugly to the longitudinal outline of the side of the boat.

Further details, and the advantages obtainable with the invention, will be explained with reference to the accompanying somewhat diagrammatic drawings, in which:

Figures 1 and 2 represent in side elevation and in horizontal cross section respectively the arms of two luffing davits of the usual construction, the out-board position being indicated in Figure 1 in dotted lines;

Figures 3 and 4 are corresponding views of luffing davits according to the invention;

Figures 5, 6 and 7 show further known profiles of davit arms; and

Figures 8, 9 and 10 represent corresponding profiles, as modified according to the invention.

In Figures 1 and 2 the davit arms, from which a boat 12 is suspended, are denoted by 13. They are rotatable in a plane transverse to the ship, are secured to the edge of the deck 14, and are of rectangular boxlike profile. They likewise serve, amongst other things, as supports for the boat, and are provided for this purpose with wooden blocks 15 of trapezoidal cross section, which are shaped to fit the outside of the boat facing the davit arms.

Now Figures 3 and 4 show that according to the invention oblique blocks are not used, but the davit arms themselves are so shaped as to fit closely to the wall of the boat, with the interposition of thin, flat plates of wood. From a comparison of Figures 1 and 2 with Figures 3 and 4 the advantages of this design over the usual construction will be immediately obvious.

In the first place there is a saving of deck space, for the free width of the deck is increased on both sides, by adopting this invention, by a distance a .

Further, the bending moment in the davit arm arising from the weight of the boat is diminished. Whereas with the usual design the lever arm of the bending moment for the most severely stressed cross section in the out-board position is equal to B , with the structure according to the invention, other conditions being the same, the bending arm is equal to b . Usually b is less than B by more than 10 per cent. The davit arm may consequently be made correspondingly lighter.

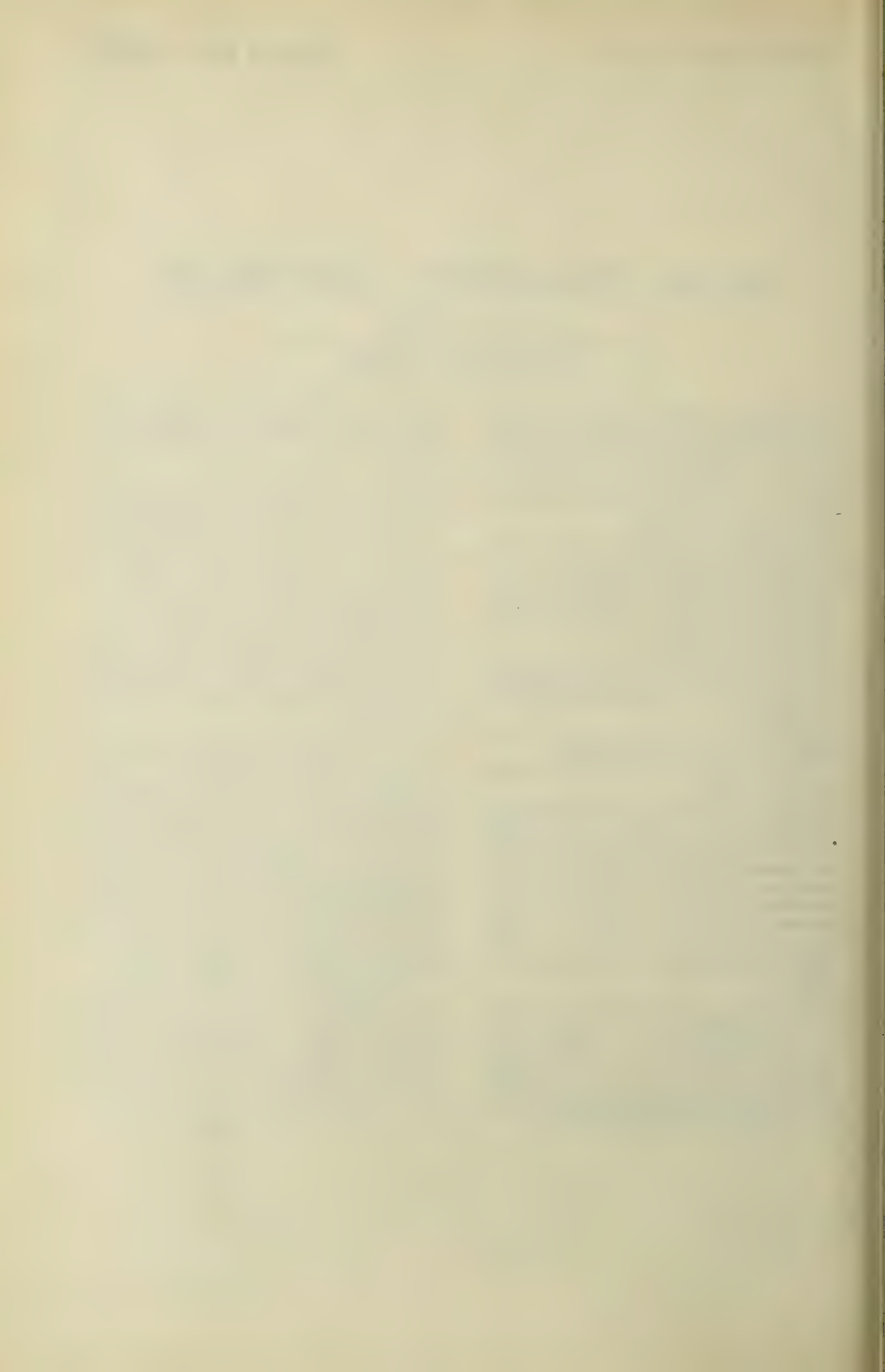
It is also possible by adopting this invention to use simple, flat wood blocks. This yields a saving of material and of labour costs, since trapezoidal blocks are difficult to make, quite apart from the fact that they are liable to split and splinter at the sharp edges.

Finally a davit arm according to the invention has a more pleasing form in side elevation, since its curvature need not be so marked.

Figures 8, 9 and 10 show further davit profiles according to the invention. From a comparison between Figures 5 and 8 it is evident that the invention can also be applied to davit arms of double-T profile. Davit arms of channel-shaped profile, as shown in Figure 6, or of circular cross section, as shown in Figure 7, can also advantageously be adapted to the shape of the wall of the boat, as shown in Figures 9 and 10 respectively. With regard to Figure 9 it is also to be observed that the open side of the channel section may if desired be closed by means of a plate.

The invention is also suitable for davits the arms of which do not serve at the same time as supports for the boat. If the boat then rests, in the in-board position, upon chocks that are independent of the davits, and is therefore not supported by blocks secured to the davit arms, the advantage mentioned with respect to these blocks does not of course arise.

ANE PIETER SCHAT.



PUBLISHED
APRIL 27, 1943.
BY A. P. C.

A. P. SCHAT
SHIPS' LIFEBOATS
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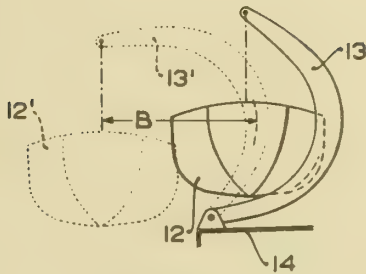


FIG. 1

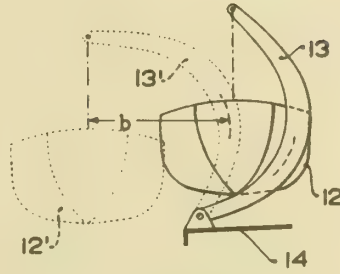


FIG. 3



FIG. 2

FIG. 4

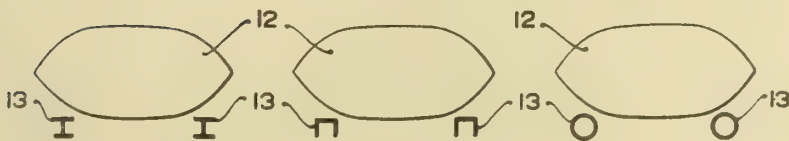


FIG. 5

FIG. 6

FIG. 7

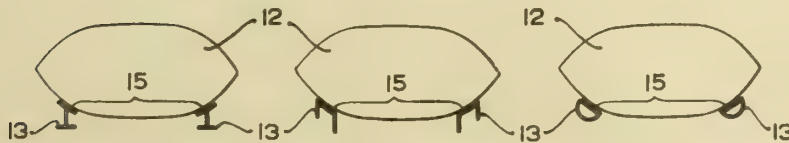


FIG. 8

FIG. 9

FIG. 10

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ALIEN PROPERTY CUSTODIAN

PROCESS AND DEVICE FOR MANUFACTURING PRESSINGS

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Alien Property Custodian

Application filed February 8, 1940

The invention relates to a new process and device for manufacturing pressings made of artificial resin and like materials and especially pressings with side faces parallel to the direction of the stroke of the press. This process and device is especially suitable for manufacturing printing material, margin sticks, etc. Formerly it was necessary to construct press moulds for artificial resin pressings and the like with slightly conical side walls avoiding sharp edges, as otherwise it was very difficult to disconnect the pressing from the mould. For certain purposes, especially for printing material and the like, however, only pressings of very accurate dimensions with absolutely parallel walls and sharp edges can be used. According to the invention the distance between the side walls of the press mould can be adjusted in accordance with the required dimension of the pressing, and after pressing had been finished this distance can be increased so that in spite of the parallel walls and the sharp edges the pressing easily can be taken out. The adjustment of the mould walls can be effected in such a manner that the shrinkage of the pressing is taken in account.

Therefore the process according to the invention on one hand renders it possible to manufacture pressings especially with side walls parallel to the direction of the stroke of the press and sharp edges with greatest accuracy of the dimensions, and on the other hand preserves the pressing from damages because in view of the fact that the distance between the side walls of the mould is increased after pressing had been finished, the removal of the pressing can be effected easily and without employing force.

By the process according to the invention printing material—especially margin sticks, etc.—can be made of masses which can be pressed. The articles just mentioned must be provided with parallel, non-conical side walls and the prescribed exact dimensions must be guaranteed. With printing material the exactness of the dimensions must correspond to $\frac{1}{1000}$ of a millimeter. Up to now only printing material made of lead, type metal, etc. could be used and iron for the base sticks, etc.

In view of the exact adjustment of the press mould in accordance with the invention, taking in account also the shrinkage, pressings can be made with such an accuracy that the same can be used directly and without finishing operations even for printing material. According to the invention the accuracy of the dimensions of the pressings within the limits prescribed by the

special purpose for which the pressings shall be used is guaranteed by the fine adjustment of the distance between the walls of the press mould. Therefore, artificial resin and the like substances can be used for pressed articles which up to now in view of the difficulty or impossibility to press such articles with parallel side walls and greatest accuracy could not be used. Therefore valuable substances can be saved and greater economy can be achieved. For instance with printing by the possibility to make use of artificial resin and the like great economy can be achieved by saving the comparatively expensive lead. Furthermore the weight of the composition is reduced to such an extent that the printing press can work with a velocity 30% higher than the velocity possible up to now. The life of the substance used according to the invention practically is not limited at all, whereas printing material made of lead and the like can be damaged easily so that it becomes useless.

According to the invention the adjustment of the press mould walls and the increase of the distance between the same after pressing had been finished is effected by the same means, whereby the adjustment or fine adjustment is facilitated by adjustable stops. Therefore the adjustment and opening of the press mould as well as an alteration of the width of the mould can be effected by simplest manipulation. Advantageously however only the adjustment of the dimension of the mould normal to the direction of the stroke of the press is effected by a corresponding adjustment of the walls of the mould, whereas the adjustment of the height of the pressing is effected by an adjustment of the plunger or the punch.

Manufacturing of bar shaped pressings can be made in such a manner that only the width and the height or eventually only the width of the bar is adjusted in accordance with the invention, whereas the exact length of the bar is made by subsequent finishing operations of the ends of the bar. For instance therefore bars as used for sticks in printing can be pressed in greater length provided with grooves or the like, so that the bar can be easily broken into corresponding lengths and finished afterwards.

The process according to the invention can be simplified materially by making use of preformed (briquetted) pieces made separately instead of filling the press mould with powder.

The device for carrying out the process according to the invention in essence is characterized by a press mould, at least one of the walls

of the mould being arranged in an adjustable manner in such a way that the mould can be adjusted to correspond exactly to certain dimensions, and that the mould can be opened. According to the invention the adjustment of the wall or walls of the mould is effected by a movable wedge or the like, whereby in order to facilitate the exact adjustment of the distance of the mould walls the movement of the wedge or the like can be limited by adjustable stops. Advantageously the arrangement is made in such a manner that the wedge supports the movable wall over the whole length of the same.

In order to facilitate the removal of the pressing the device can be constructed in such a manner that one wall of the mould or a part of the same is connected with the plunger, so that in the opened position the pressing can be thrown out by a discharging part provided on the opposite wall. The preformed (briquetted) piece can be inserted through the same opening.

According to the invention pressings of comparatively great length can be manufactured with greatest accuracy and absolute uniformity.

In the drawing a constructional form of the device according to the invention is shown in a schematic manner. Fig. 1 shows the press mould in upright projection partly in section. Fig. 2 shows a section along II—II of Fig. 1, and Fig. 3 shows a section along III—III of Fig. 2.

1 is the hollow space of a mould adapted for bar-shaped pressings, 2 is the fixed wall which advantageously is provided with an exchangeable plate 2', and 3 is the movable wall. Between the body 4 of the mould and the movable wall 3 a wedge 5 with slight pitch is arranged. By moving the wedge 5 in its longitudinal direction, the wall 3 can be adjusted so that the width of the mould can be made greater or smaller whereby, as shown in Fig. 3, the wedge serves as a guide for the wall 3. The adjustment of the wedge 5 is effected by a screw spindle 6 cooperating with the screw nut provided in the bridge piece 8 connected to the body of the mould by stay bolts 7. Instead of the screw spindle, of course also a lever mechanism can be used, eventually with fine and coarse adjustment. The end of the screw spindle 6 is provided with a collar 10 cooperating with a groove 9 in the broader end of the wedge 5. By pushing the wedge 5 to the right hand side the distance between the walls 2 and 3 becomes greater so that the finished pressing easily can be removed out of the mould. By pushing the wedge 5 to the left hand side the distance between the walls 2 and 3 becomes smaller. The pitch of the wedge 5 is so slight that the press power is taken up by the wedge so that no power transmission takes place on the screw spindle.

A cover plate 30 is connected to the body 4 of the mould, the cover plate serving as a guide for the movable wall 3. In view of the arrangement of the cover plate the movable wall 3 cannot move upwardly. The friction of the wedge during its movement is diminished by providing a groove 32 in the rear side of the wall 3, and the wedge 5 itself is provided with a groove 33 so that the parts are supported only by the strips 34 and 35.

The adjustment of the mould in accordance with the prescribed exact dimension is effected by the adjusting screw or stop 11 limiting the movement of the wedge to the left. The screw head 12 is provided with a scale so that the adjustment can be made easily. The adjusting screw 11 can be provided with a locking nut 13. Closing of the mould is effected by turning the spindle 6 until the wedge comes to the stop 11. Therefore the exact adjustment of the mould is maintained notwithstanding the fact that the mould is opened after each pressing operation.

The adjusting screw 11 is guided in a cover plate 15 connected to the body of the mould by screws 14.

In order to enable a lateral removal of the finished pressing the cover plate 15 is provided with an opening 16 closed by a slide 26 guided in the cover plate 15. This slide 26 constituting at the same time a wall of the mould is connected with a plunger 17 in such a manner that the mould is closed automatically by the slide 26 during the beginning of the pressing stroke of the plunger and opened again at the end of the return stroke of the plunger. The opposite cover plate 18 of the mould is provided with a hole serving as a guide for the discharging bar 19. Furthermore, the discharging bar 19 is guided in the bridge piece 8 and is kept in its withdrawn position by a spring 20. By pushing the knob 21 of the bar, the finished pressing easily can be removed from the mould through the opposite opening.

The cover plate 18 is guided by pins 22 provided in the body of the mould and is pressed against the body of the mould by screw spindles 23. It will be understood that therefore by loosening or removing the cover plate cleaning of the mould can be effected easily.

The form of execution of the device illustrated in the drawing serves for manufacturing pressings which can be used as blind sticks in printing. Therefore the plunger is provided with projections 24 forming corresponding grooves in the stick so that material is saved and the stick gets the common form of lead sticks. To simplify the device, several sticks are pressed in one single piece and the pressing is divided afterwards correspondingly. For this purpose the plunger is provided with greater projections 25 distributed in accordance with the required length of the sticks, the projections 25 weakening the pressing in such a manner that it can be broken easily. The place of breaking can be subjected afterwards to a finishing operation.

The exact adjustment of the height of the pressing is effected by a corresponding adjustment of the plunger or the punch. For this purpose plates 27 or the like of different thickness can be inserted between the punch and the head 29.

In order to facilitate the elimination of superfluous material and air between the punch and the mould walls, grooves 28 can be provided in the punch.

ALFRED SUCHANN.

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APRIL 27, 1943.
BY A. P. C.

A. SUCHANN
PROCESS AND DEVICE FOR
MANUFACTURING PRESSINGS
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317,950

Fig. 1

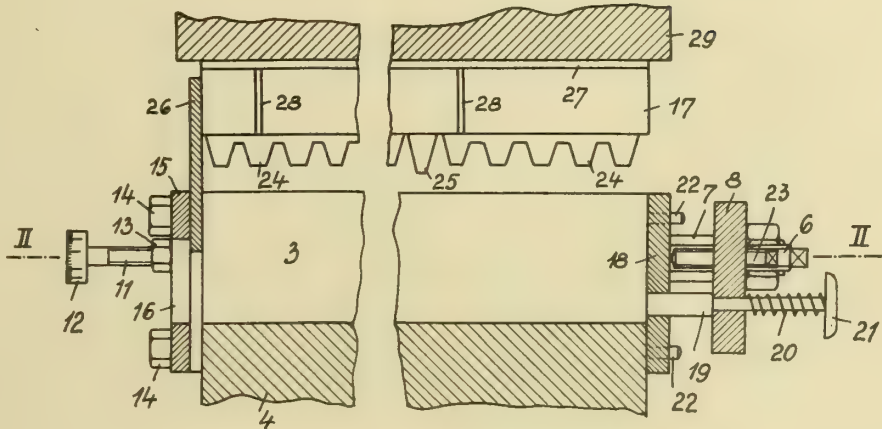


Fig. 2

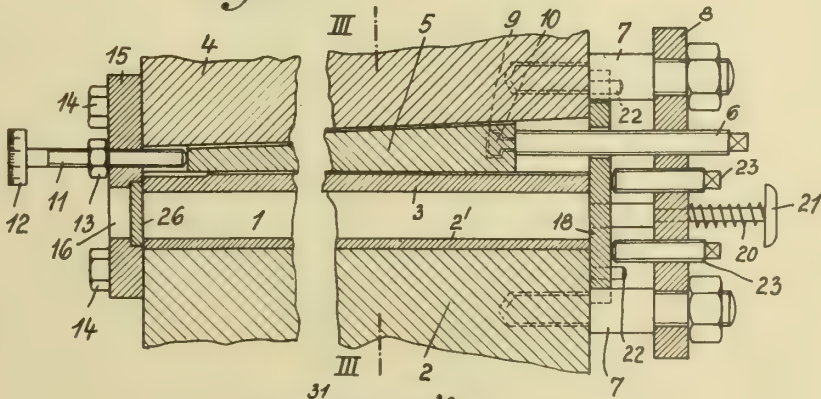
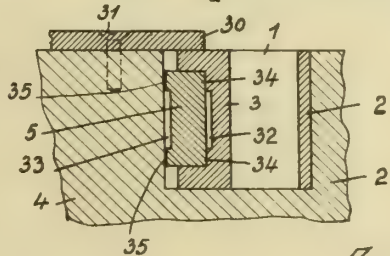


Fig. 3



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A. Suchann

By *Glascock Downing & Co.*

ALIEN PROPERTY CUSTODIAN

RECORD FILING CABINET OR THE LIKE ETC.

Enrico Bertello, Borgo S. Dalmazzo (Cuneo),
Italy; vested in the Alien Property Custodian

Application filed February 8, 1940

This invention relates to a large record filing cabinet or the like, operable by electro-mechanical movement for the purpose of bringing to light or turning up the records placed therein in a very rapid and practical manner.

The invention consists essentially of one or more drums, functioning as file drawers and adapted to turn under the action of electrical forces produced indirectly by the striking of keys on a keyboard, each of which keys is directly or indirectly connected to a particular sector of the drum (in the case of only a single drum) or to one of the individual drums, when a plurality of drums are employed.

Two methods of carrying out the invention are here envisaged, one a simple construction and the other more detailed.

According to the first method of carrying out the invention, the apparatus consists of a single large drum having drawers therein and adapted to rotate through an arc of predetermined size in accordance with the duration of closing of ordinary electrical contacts which contacts are closed for a definite and varying period by each of the keys of the keyboard, and through the intermediary of mechanical devices, such that, in order to turn up a particular record, it is necessary first to ascertain in which sector of the drum it is located, and then to cause the rotation of the drum so that the sector or the record required is presented to the searcher who must finally carry out a small operation of selection in the sector according to the second method of carrying out the invention, which represents essentially a considerable improvement of the first method; the rotation of the drum, which, however, is in this case, replaced by a plurality of independent drums, is effected according to the number of the record desired to be turned up by the operation of separate electric circuits adapted to set in rotation through a suitable arc of a circle only one particular drum, that is to say, the drum pertaining to the record to be turned up, such that, in order to find a previously designated record, it is only necessary for the searcher to set up on the keyboard the corresponding number in order that the drum in question, and only that drum, shall rotate so that the required record is brought into position.

In accordance with the second method of carrying out the invention, the apparatus includes also a "rubric" or column, having a continuous automatic band, unlimited in its contents, continuous in the sense that it is capable of movement of translation in two directions; automatic in the sense that it functions automatically by the

mere pressure of a key and finally unlimited in the sense that it can be increased and lengthened, as desired, by the addition or insertion of any quantity of band as may be necessary.

In order that the invention may be fully understood, I shall now describe three embodiments thereof by way of example by reference to the accompanying drawings, in which:—

Fig. 1 is an external view of a cabinet embodying the invention.

Fig. 2 is a diagrammatic view of the operating mechanism for carrying out the first embodiment.

Fig. 3 is a general section showing the mechanism for carrying out the second embodiment.

Fig. 4 is a section on the line *a—b* of Fig. 1.

Fig. 5 is a general section of the automatic

Fig. 6 is a general section according to the third embodiment, and

Fig. 7 is a section on the line *a—b* of Fig. 6.

Referring first to the first embodiment, particularly to Fig. 2, 1 denotes the drum consisting of the cylindrical spokes *a, b, c* carrying small boxes or files. The cylinder is rigidly connected to the wheel 3 furnished with spokes corresponding in number to the number of the elements *a, b, c*; between each pair of the spokes 5 is located an abutment or projection adapted to strike against the movable abutment 6 fixed to a cross bar 7 itself connected, through the medium of a system of levers L, to the keyboard. The keyboard 8, through the said lever system L, and the complementary system L₁, controls the toothed sector 9 adapted to actuate the electrical contact 10 exciting the motor 11 so as, through the medium of the transmission 12, to cause the rotary movement of the gearing 13 and consequently the rotation of the wheel 3 and the shaft 4. The toothed sector 9 which is actuated by the lever systems L₁ and L by the keys 8, can be displaced proportionately to the angle A by the rods 15 of the sliders or selectors 16 actuated by rods 17 connected by angle strips 18. The arrangement may, however, be disposed around a vertical axis or one inclined to any desired extent, on a horizontal plane, or according to a gyroscopic method.

The above described arrangement functions in the following manner:

Assuming that each key is arranged such that, on the one hand it corresponds to a predetermined projection or abutment of the driving wheel for the purpose of producing a rotation in proportion to the duration of the electrical contact and, on the other hand, corresponds to a predetermined sector of the drum (thus, for ex-

ample, the key T is connected or related with S on the one hand, and on the other hand with when it is desired, for example, to turn up a record in the sector C, the key T, corresponding to the abutment S and the sector C, is pressed down such that the slider 16 moves the rod 15 to the desired extent so as, by means of the lever system L, to move the cross bar 7 radially of the drum so that the oscillating arm 6 strikes the projection S pertaining to the key T owing to the rotation of the wheel 3 effected by the motor 11 which simultaneously with the displacement of the bar 7 has been set in motion by the contact 10 itself closed by the simple operation of pressing down the key T.

At the moment when the projection S strikes against the arm C, the oscillating frame 19 of which the pawl 20 forms part, will, owing to the lowering thereof, produced by the impact, becomes freed from the toothed sector 9 which will thereupon return to its original position of rest together with the systems of levers L₁ and L and the apparatus will be again ready for a second operation. It will be understood, of course, that some of the mechanical devices may be eliminated and various constructional modifications introduced.

Referring now to the second embodiment, Figs. 3 and 4, the electric mechanism acting in dependence on the record (or, rather, the number of the record) which it is desired to turn up consists of a board or panel of selective contacts adapted to be actuated by levers connected to the keys of the keyboard in such a manner as to form the number corresponding to the record by energising particular electric contacts as well as the abutments against which bear the strikers adapted to determine (by reason of the position necessitated by the abutments and owing to their construction as racks acting on an axis carrying a contact disc) the relative position of the said contact disc which being furnished with interruptions causing, through the medium of an electro-magnet the braking of the axis which takes the movement of the driving shaft constantly in movement, and consequently the rotation of the drum in question by the amount of an arc corresponding to the position taken by the contact disc, and in the second place corresponding to the number set up on the selection panel with respect to the abutments activated thereby. Obviously, the apparatus outlined above calls for secondary devices necessary for its automatic functioning, such as the slide device for carrying the panel in a suitable position for undergoing the effect of the levers acting on it, the device for returning the parts to their state of rest, the braking arrangement for the principal axis, and the electric circuits connecting the electro-magnets to the contact discs.

The column having an automatic band consists of an electro-mechanical device connected to a keyboard corresponding to the letters of the alphabet by which the contacts controlling two electro-magnets are actuated, the electro-magnets, in their turn controlling two couplings adapted to cause the rotation of one of the drums on which is wound the band of the column for carrying it into the section of the letter desired.

In describing the apparatus having two hundred drawers per drum, an electric motor 11 (Fig. 3) connected to the main circuit actuates through the medium of the transmission 12 the shaft 4 provided with clutches 21 carrying the drums 1 themselves carrying drawers 2.

Each clutch 21 is also controlled by an electro-magnet 22 electrically coupled to the contact disc 23 coaxial with the disc 24 synchronised by means of the chain 25 with the corresponding drum. The keys 8 are moreover connected to levers 27 which are profiled and articulated at 28 and adapted to press on the pushers 29 movably located on the slide 30 in a vertical series of five elements (series S) and of ten elements (series T) of which each movable element serves respectively to form the number of the drum and the number of the particular drawer carried by this drum. The pushers of the series S are also coupled electrically through the medium of circuits to the corresponding contact disc 23 the rotation of which is limited or determined by the vertical rack-like sliders 31 and 31¹, the position of which is, in its turn, determined through the lever system L₃ by the movable pushers of the series T and is effected by the gearing and the rack 32 actuated by the pawl 33 slidable in the double helix 34 bored on the countershaft 35 which, itself, takes its continuous movement from the guiding shaft 4 by means of the transmission 36.

An electro-magnet 37 is, moreover, provided for effecting the double role of controlling the displacement of the rack 32 adapted to allow vertical displacement of the slides 31 and 31¹ as well as to return, to its initial position, the slide 30 by means of the lever 38 and the clutch 39 adapted to enter one of the holes 40 so as to cause the rotation of the pulley 41 and consequently the winding of the flexible band 42.

The slide 30, moreover, comprises a mechanism of translation in the direction of the arrow F¹ coupled to the movement of the keys 8 and constituted by an oscillating spring rod 43 acting through the intermediary of the lever system 44 such that a pawl on the toothed wheel 45 engages with the rack 46 on which the slide is mounted to cause it to advance one step according to the interior profile 45¹ of the wheel 45 at each operation of a key, the state of rest of the system being assured by the position of the pawl 44¹ on the projection profile 45¹¹.

In order to return the pushers of the series S and T to their initial position, the carriage 30 is, moreover, provided with a hinged flap having members 48 adapted to abut the pushers, this flap being actuated automatically by the projection 49 sliding flexibly on the inclined plane 50.

In the case under consideration in which the drums carry 200 drawers the apparatus includes a particular arrangement according to which the contact disc 23 is provided with two interruptions in which are inserted two contacts 51 and 52 which receive their current from a commutator on the electro-magnet 53 according to whether it is a question of the drawers comprised in the first or in the second hundred of each drum.

Referring to the sliders 31 and 31¹ it must be noted that being coupled in their movements, the first 31, functions with respect to the tens (constituting the number to be formed) and the second, 31¹, functions with respect to the units in such a manner that 31 acts on the axis 26 of the contact disc 23 through the intermediary of the pinion 54 actuated by the rack 55 which is slidably mounted to permit of an additional translation 55¹ caused by the slider 31¹ through the system of translation 56 to which the rack 55 is coupled by the pivot 57 so as to produce a flexible connection between the two sliders. Moreover, the movements of the said sliders are regulated by the device 32 through the friction

system 58 which controls these movements through the medium of the lever system L3. The drums 1 also include a brake device 59 for the purpose of reducing their rotation at the moment of the de-clutching or disengagement of their shaft. The arrangement includes, moreover, a general push button interrupter 60.

The automatic column device, which has for its purpose to permit the turning up or finding of the number of a record in the sense of causing the column to slide at a remarkable speed and to stop it at the correct moment, consists of the band wound on the drums 62s and 62d, which take their movement from the main shaft 4 through the medium of the transmission 63 coupled to the shaft 54 on which are located the clutches 65s and 65d adapted to drop in the one direction or the other, the one or the other drum 62s or 62d by means of the transmission bands 66s and 66d. The device is, moreover, coupled by a chain transmission 67 to the endless screw or worm 68 of the keyboard 68 which carries as many keys 69 as there are letters of the alphabet. Below each key is mounted an oscillating angular stop 70 adapted to be turned by the nut 71 for the purpose of exciting the right or left contact 72d or 72s of the push button 69 which by means of suitable circuits excites the electro-magnets 74s and 74d adapted to control the clutches 65s and 65d, so as to cause the rotation in the desired sense.

In considering the case of an apparatus formed of 10 drums (A, B, C, D, E, F, &c.) which are independent and each carry two hundred drawers, the functioning of the apparatus is as follows:

Assuming the apparatus to be set in motion, the shaft 4 rotates freely, the clutches 21 being disengaged, as is shown in the drawings, and further assuming that it is desired to turn up the record classified under No. 334, that is to say, under a number contained in the first hundred drawers of the fifth drum (E), at this moment the carriage 30 is displaced completely to the left, the key corresponding to the number 8 is pressed so that the lever 27 connected to the key 8 strikes the corresponding pusher of the series S of the hundreds or selector of the drum so as to displace it forwardly with respect to the rear plane of the carriage so as to close the selector circuit through the medium of the electro-magnet 22E; at this moment the key under the action of the spring rod 43 will cause, through the medium of the mechanism 44, 45, 46, the carriage to be displaced one step to the right. Then the key 3 of the tens is now pressed so that the lever 27 of the key 3 pushes the corresponding pushers of the series S2 and T2, the first of which (the pusher of the series S2) in this case does not act, whilst the second (pusher of the series T2) determines and selects the ten; immediately on the release of the key 3 the carriage, under the action of the spring rod 42, will be displaced to the right through another stage so that at the instance of pressing the key 4 (of the units) the pushers of the series S3 and T3 will be found in the position suitable for being acted on by the lever of the pertaining key as in the preceding operation. At this instant the number 334 corresponding to the record to be turned up, will have been set up on the carriage of the pushers and likewise the contacts pertaining to the selection of the drum, the particular sector of the drum or the drawer will be found to have been completed through the circuit W which at the

moment of the closing of the interrupter 60 (electrically connected to the circuit X of the mains) causes the electro-magnet 37 to be excited, as well as the particular electro-magnet of the drum 22E in question, so as to force the pawl 33 in the pathway 34 which, in its turn, causes the displacement in the direction of the arrow F, of the rack 32 and causing the movement of the friction arms 58 in the direction of the arrow F¹¹, which arm, through the medium of the lever system L3, cause, in their turn, the descent of the slides 31 and 31¹ until they abut against the displaced pushers of the carriage (indicated by the numeral 30 in the drawing) which, in their turn, cause the rotation of the shaft 25 determining also the relative position of the contact disc 23, it being noted that the slider 31 causes directly the rotation of the shaft 26, whilst the action of the slider 31¹ (of the units) is effected through the additional movement produced by the system 56.

Simultaneously, the circuit of the electro-magnet 22E is closed, thereby causing the engagement of the pertaining clutch 24E and by means of the pivot 59¹ disengages the brake and engages the whole friction transmission system R for the movement of the drum. Now, since the electro-magnet 22E remains closed when the pusher of the interrupter 60 reassumes its position by reason of the circuit Y and the contacts Y¹ connected to the bar of the electro-magnet, the drum E starts to rotate, transmitting its movement by means of the transmission 25E to the disc 24 until the contact 24¹ which returns with slight friction on the contact disc 23 arrives on the interruption or break 52 which, in this case, is not energised, and the electro-magnet 22E is de-energised and consequently disengages the clutch 21, disengages the pushers 59¹ and the friction brake acts to stop the drum at the exact point required.

At the same time, the electro-magnet 37 is de-magnetised and the spring 32 disengaged; the pawl 33 is caused to engage in the return path of the helix 34 thereby causing the whole apparatus to return into a state of rest, including the sliders 31 and 31¹ whilst, by reason of the play of the pawl 38¹ which abuts the pusher 37¹, the lever 38 forces the member 41 to push the pusher 39 into the hole 40, thereby causing the rotation of the pulley 41 which winding up the band 42 draws the carriage 30 into its initial position where the pin 39 which is provided with a secondary pin 39¹ slides on the inclined plane 40¹ thereby causing the disengagement of the pin 39 from the hole 40 so that all the members have resumed their initial position.

Assuming now that it is desired to turn up the record classified under the number 934, that is to say, a number of the second hundreds carried by the same drum E as previously used, the lever of the key D will strike the pusher E of the series S1 as previously, as well as the pusher 9 of the series T, which being electrically coupled to the electro-magnet 53 causes the energizing of the latter through the contact 53¹ which, through the circuit Z, feeds the current to the contact 52 and insulating the contact 51 (which in the preceding operation was given current by the circuit U) such that the drum turns beyond 52 so as to present the drawers beyond the first hundred, that is to say, whilst, in the first case, the drum rotates up to the limit of the interruption or brake 52 (which was not given current) in the case now under consideration, the drum rotates beyond the brake 52, that is to say, up to the limit of the interruption 51 which is not given

current. The remaining operations and movements are the same as above described.

Where it is required to turn up a record classified by a number of four digits, for example 1758, and assuming knowledge of the essential operation of pressing the keys one after the other, the mechanism functions in the following manner:

In this case the carriage has to carry out an additional step (four instead of three) that is to say it occupies a position such that the contact 30¹¹, in its turn, occupies the position of the contacts 30¹ so that the pushers of the series T1 no longer function electrically, since it results through the corresponding pushers of the series T2 and, at the same time, by reason of the inclined plane 80, the rod 31 is moved by the contact 82 to insulate all the pushers of the series S, whilst the pushers of the series S2 cause, through the series S4, the closing of the circuit of the drums beyond the fifth, that is to say, the drums carrying records classified under a number above the first thousand. Obviously the position of all the series of pushers is displaced through one step so that the pushers of the series T3 determine the tens and those of the series T4 the units (the hundreds being determined by the contact disc 23); all the other movements and operations are carried out as described above.

According to the third embodiment, the apparatus acts in accordance with the index number of the record to be turned up and not by forming the number on the keyboard, but by picking out the number on the dials located concentrically to the knob or button, each of which corresponds to one of the drums of which the apparatus is comprised in such a manner that each drum constitutes a simple apparatus, and each dial carries as many numbers as there are drawers in each drum.

To this end the apparatus according to the third embodiment consists essentially of an indefinite series of drums carrying drawers, each of which is electrically and mechanically connected to a knob or button fixedly connected to a pointer turning on the dial and mounted on the same axis of the contact disc, such that by turning the knob with respect to the number arranged on the dial, the contact disc is compelled to take up a definite position, similarly as occurred in the previously described embodiment by causing a rotation of the drum in question.

In accordance with this embodiment, the drum 1 carrying the drawers carries a transmission 25 for synchronisation of the disc 26 freely mounted on the shaft 27 of the knob 85 on which is also fixed the contact disc 23 on which frictionally rolls the contact 24¹.

The said shaft or spindle 87 also has fixed thereon the pointer 86 turning around the dial 88 on which are progressively inscribed the numbers of the drawers of the drum.

The above described arrangement functions in the following manner:

If it is desired, for example, to turn up the record classified by the number 47, the pointer 86 is moved to this number on the corresponding dial and automatically the contact disc is caused to rotate up to the point where the interruption or break 51 comes into the corresponding position, such that the circuit W is closed through the medium of the contact 24¹ of the synchronized disc 24 which causes through the electromagnet 22 the engagement of the clutch 21 and, by reason of this, the rotation of the drum until the contact 24¹ becomes positioned in communication with the interruption or break 51 which, by breaking the circuit, causes the contrary action, that is to say, the opening of the circuit W, the disengagement of 21 and consequently, through the medium of the automatic brake 59, the arrest of the drum. If it is desired to turn up a record in another cylinder, it is necessary to have recourse to the corresponding knob, and so on, each dial carrying the progressive numbers of the records contained in the drums.

With regard to the above method of operation, it will be appreciated that this latter embodiment provides the possibility of turning any number of drums at one time, whilst the previous embodiments envisage only the rotation of a single drum at the one time.

The column or "rubric" operates in the following manner:

Since the band carries in alphabetical order the name of the record and the number of the drawer in which the record is housed, and assuming that it is desired to turn up the number of a record, the initial of the name of which is the letter B, the column being at this moment located on a letter arranged to the right of the said letter B on the keyboard, the key B is pressed, thereby causing the closing of the contact 72d of the corresponding circuit, which exciting the pertaining electro-magnet 74d, causes the engagement of the pertaining clutch 65d, thereby causing the drum 62d to draw the band in the sense desired until, by reason of the synchronous displacement of the nut 71, the latter strikes against the end of the interrupter, which will thus be disengaged from the grippers 83 and, by means of a spring 84, will reassume its initial position. It must, however, be noted that, during its movement, the nut 71 alters the orientation of the angular contacts 70 of all the keys encountered over its path, which operation will be effected in the reverse manner in the subsequent operation, and thus in succession such that the contacts 70 are always left placed according to the direction of operation.

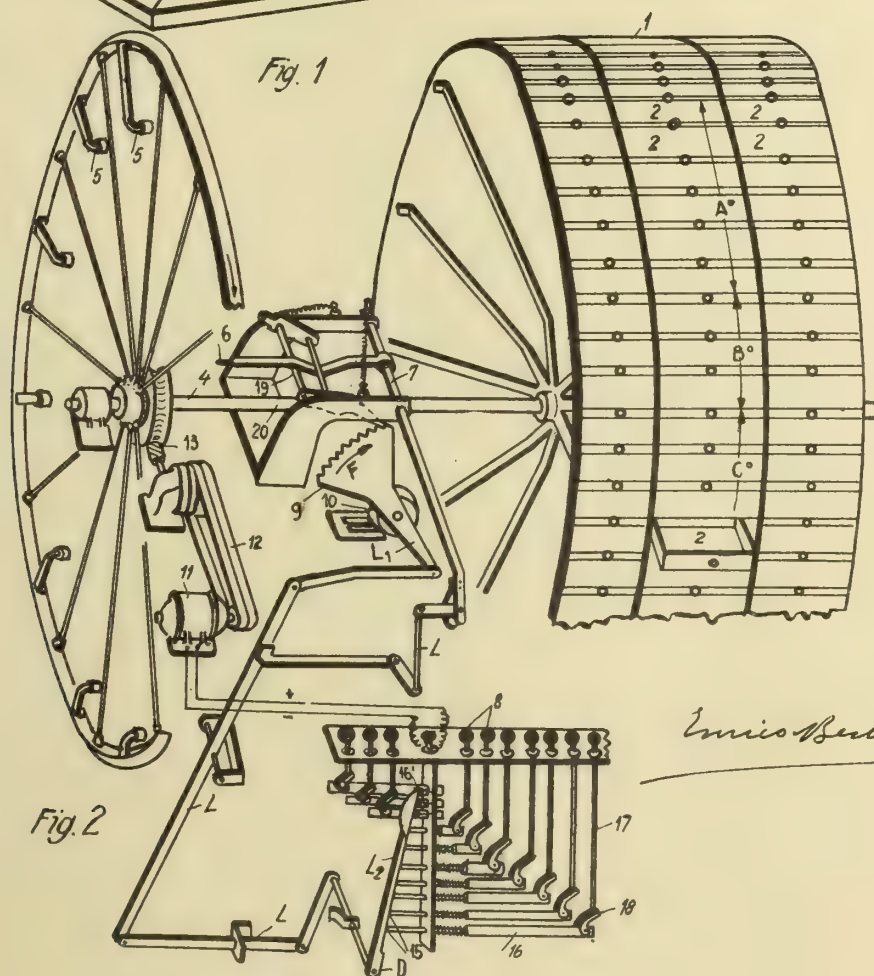
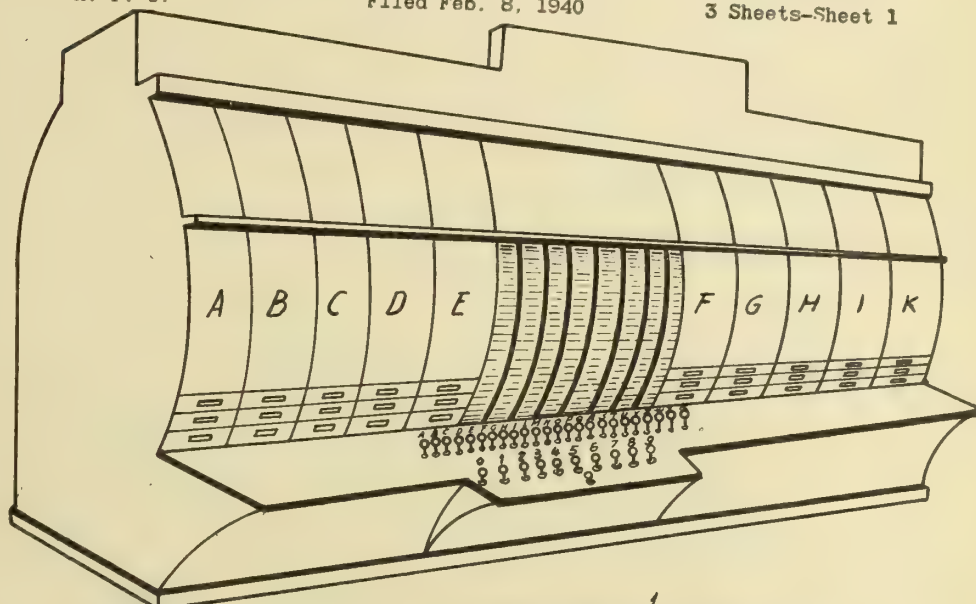
Obviously, the apparatus hereinbefore described is susceptible of various constructional modifications without departing from the spirit of the invention.

ENRICO BERTELLO.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

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Serial No.
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3 Sheets-Sheet 1



Emilio Bertello

PUBLISHED

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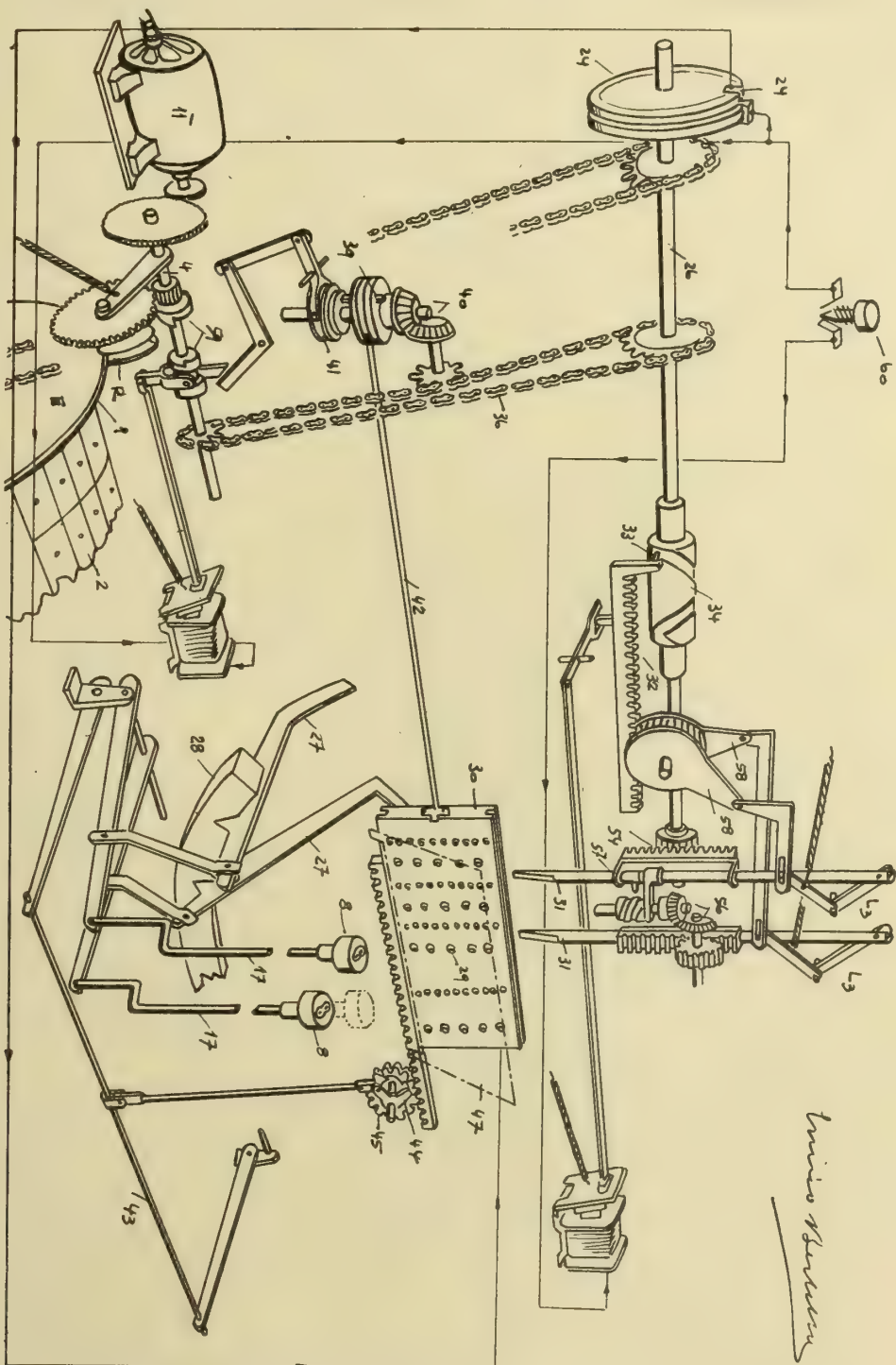
RECORD FILING CABINET OR THE LIKE ETC

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BY A. P. G.

Filed Feb. 8, 1940

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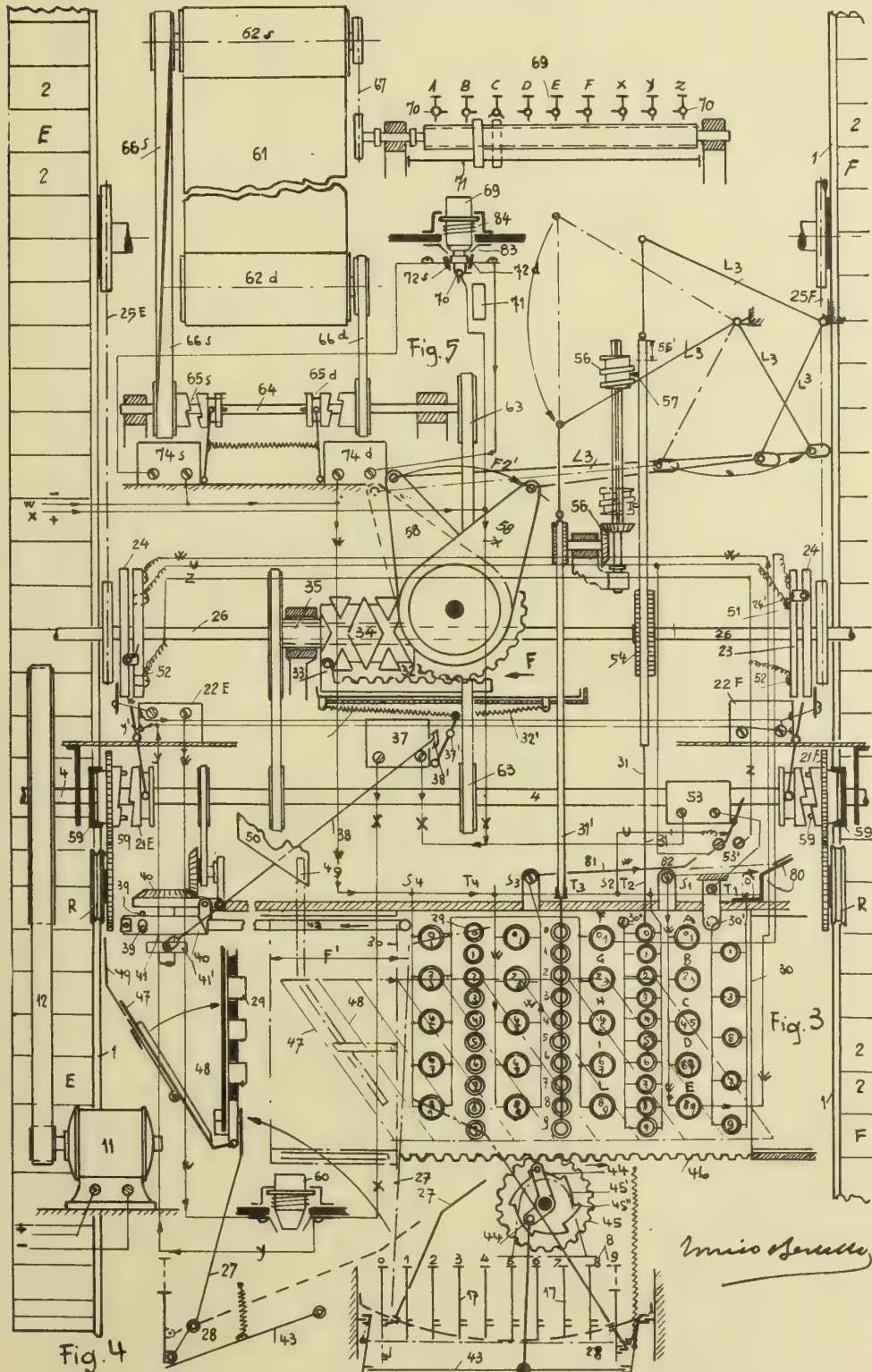
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RECORD FILING CABINET OR THE LIKE ETC

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ALIEN PROPERTY CUSTODIAN

SNAP FASTENERS

Alfred Boenecke, Berlin-Schoneberg, Germany;
vested in the Alien Property Custodian

Application filed February 16, 1940

This invention relates to a snap fastener made from nonmetallic material, preferably an artificial substance that can be die-cast or pressed.

It is known to make the ball member or the socket member of a snap fastener integral with the base portion which is slotted to increase the yieldability and elasticity of the base member. The construction of the known types of fasteners of this class has hitherto been based on the use of metallic material. Conditions are different, however, when synthetic, i. e. nonmetallic, substances serve as starting materials, and it is not possible to maintain the dimensions, particularly the wall thickness of the parts, usually chosen for metal snap fasteners to insure the necessary springiness and strength, since the wall thickness of parts made from artificial material must be relatively large to make allowance for the low breaking strength of this material.

As a large wall thickness of the snap fastener members interferes of course with the smooth and elastic introduction of the stud member into the socket member, it is an object of the invention to overcome this trouble by forming the stud member or the socket member of a snap fastener from projections arranged in a circle and individually disposed on the base portion so as to act as levers fixed at one end. These thick-walled projections are capable of swinging freely and form the yielding part of a stud member or socket member. In order to increase the yieldability of these freely swinging elements the base portion of the stud member possesses at the point where the projections extend into the base portion a corresponding number of slots disposed along the freely swinging elements of the stud member. Both the base portion and the freely swinging elements or projections arranged thereon may be thick-walled, that is, so thick and strong that they cannot be damaged, for instance by tearing or breaking, when the snap fastener is in use. The thick-walled construction of these parts does, however, not reduce the elasticity thereof, since it has been found that they possess an even greater and softer resiliency than metal snap fasteners.

When the stud member of a snap fastener has been constructed in the manner indicated, the corresponding socket member forms a rigid inelastic body.

It is possible also to construct the stud member as rigid body and to make the socket member elastic. In this case, the wall of the socket member has a U-shaped cross section open toward the stud, and the portions of the cross

sections disposed toward the central axis are slotted. Between these slots the web portions may be provided with additional openings to increase spring action.

An essential feature of the invention form the tools and the manner of producing the snap fastener. For producing the stud body and the base portion two parts that are vertically displaceable relative to one another are employed, the displacement occurring on the longitudinal central axis of the stud body which together with the base portion is formed in one operation. The two relatively displaceable parts form the impression die or die mold. One of these parts is fitted with cores for forming slots and a portion of the stud body, i. e. the portion thereof tapering toward the base portion, the cores terminating at the point where the body begins to taper, and the other part of the die or mold also possesses cores which form the slots located in the stud body itself and which are so shaped that simultaneously the head of the stud is formed above the point where tapering commences.

The impression dies or die molds employed according to the invention afford the advantage of constituting rigid structures by means of which large quantities of snap fasteners can be readily produced at the same time.

The invention is illustrated in the accompanying drawings, in which Figures 1 to 4 show one form of the invention; Figs. 5 to 8, a modification thereof; Figs. 9 to 12, another modification thereof; and Figs. 13 and 14, still another modification thereof.

More particularly:

Figure 1 is a top view of the ball and base portion for the first form of the invention.

Fig. 2 is a bottom view of Fig. 1.

Fig. 3 is a section on the line C—D, of Fig. 1.

Fig. 4 is a section on the line A—B, of Fig. 1, with the socket member attached.

Fig. 5 is a sectional view of the second form of the snap fastener with slotted socket member and rigid stud member.

Fig. 6 is a top view of a socket member shown in Fig. 5.

Fig. 7 is an inside view of a socket member shown in Fig. 5.

Fig. 8 is a bottom view of the stud plate shown in Fig. 5.

Fig. 9 is a top view of the stud member of the third form of the invention.

Fig. 10 is a bottom view thereof.

Fig. 11 is a top view of a snap fastener provided with stud member and socket member.

Fig. 12 is a section on the line A—B, of Fig. 11.

Fig. 13 is a top view of the fourth form of the invention. It is thought that further detail views which in principle would be similar to Figs. 10, 11 and 12 may be dispensed with.

Fig. 14 diagrammatically shows how by means of the tools a stud member with its base portion as shown in Fig. 13 can be produced, Fig. 14 referring to the section on the line A—C, of Fig. 13.

In the construction shown in Figs. 1 to 4, the base portion 1 provided with sewing slots 2 is integral with the stud body 3 which, as indicated in Figs. 3 and 4, tapers toward the base portion 1. The top portion of the stud member 3 forms the head, and the stud body 3, as shown in Fig. 1, has three slots 4 and a central bore 5a so that a hollow body is formed. As can be seen in Figs. 3 and 4, the slots 4 extend up to the upper face of the base portion 1.

The base portion 1 possesses slots 5 which extend along the sectorlike parts of the stud body 3, as shown in Figs. 1 and 2, and considerably assist in rendering the base portion 1 and the body member 3 flexible.

Fig. 1 further indicates that the slots 4 and 5 adjoin each other. Although the body member 3 and the base 1 are interrupted by these slots, connection between the two members is not weakened and deformation or breakage during use of the fastener is out of the question. The socket member 6 of this type of fastener is of rigid construction, as shown in Fig. 4.

The stud member is produced by two relatively displaceable pressing tools or telescoping die mold members of which parts designated 7, 8 are shown in Fig. 3.

The two die members are moved in the direction of the double arrow P, i. e. of the longitudinal axis of the stud body. As shown in Fig. 7, the mold portion 7 possesses cores for forming the slots 4 and serves also for forming the head of the stud member. The lower die 8 produces the slots 5 in the base portion 1 and also the tapering portion of the stud member. Fig. 3 shows how the two parts 7 and 8 meet at the tapering point.

In the structure shown in Figs. 5 to 7 the socket member of the fastener is yielding and elastic. For this purpose the wall of the socket is of U-shaped section, and the cross-sectional portions disposed toward the central axis possess slots 9 to render this part of the wall elastic. The wall or web portions connecting the slots 9 have openings 13 to increase the elasticity. The stud body 10 is not slotted but made rigid. The socket base 11 has slots 12 for the sewing threads, and the base portion 1 of the stud member 3 has, as stated, the sewing slots 2. To facilitate its production by means of two rigid die members as indicated above, the base portion 1 is provided with openings 14. As shown in Fig. 5, the cross-sectional profile of the socket wall is such that an edge engaging the undercut portion of the stud from below is formed to insure interlocking of both members of the snap fastener.

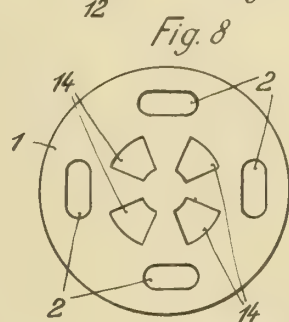
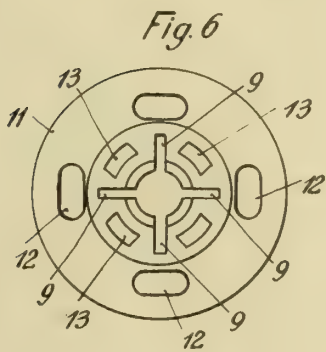
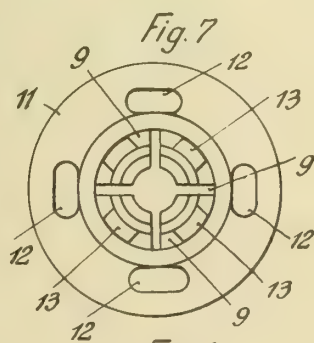
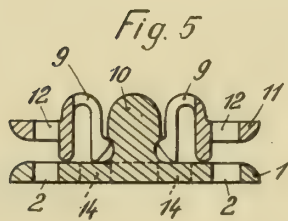
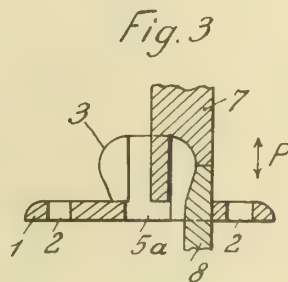
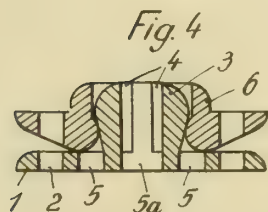
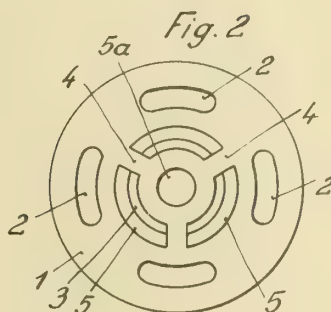
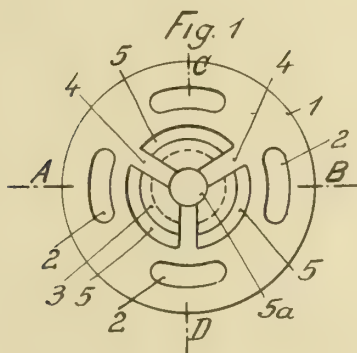
A third form of snap fastener is shown in Figs. 9 to 12, which differs from the form shown in Figs. 1 to 4 in that the slot 4 divides the stud head and the base portion and a two-part head is formed of the two projections 3.

In the construction shown by Fig. 13 the stud and base portion have through-going slots as in the third form, but the slots 4 are in this instance placed so that the stud comprises three parts formed of the three projections 3.

The tool for producing this last-mentioned structure is shown in diagram in Fig. 14 and corresponds in principle to the tool shown in Fig. 3. It comprises two relatively displaceable parts having cores shaped according to the requirements of the structure shown in Fig. 13. With the aid of lifters 20 the finished fasteners can be pressed off after opening of the tool in the direction of the arrow.

As the base 1 of the stud member in the various constructions shown is relatively weak owing to the slots, it may be reinforced by suitable accumulations of material, as for instance by the projections 19, Fig. 12. Reinforcements in spots serve also for preventing breakage of the base in the direction of the slots 4 without reducing elasticity. The sewing slots have depressions in the direction of the edge to protect the sewing thread.

ALFRED BOENECKE.



Inventor,
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By: Glascock Downing & Seebold
Attys.

Fig. 9

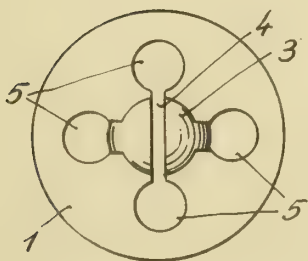


Fig. 11

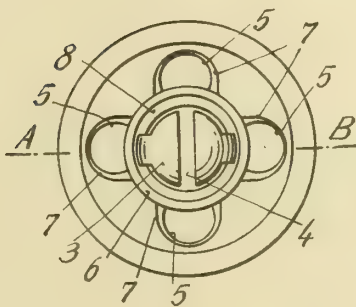


Fig. 10

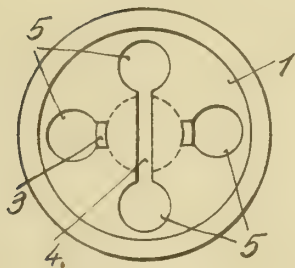


Fig. 12

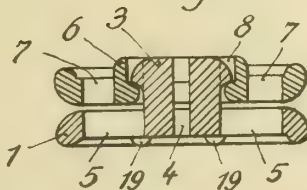


Fig. 13

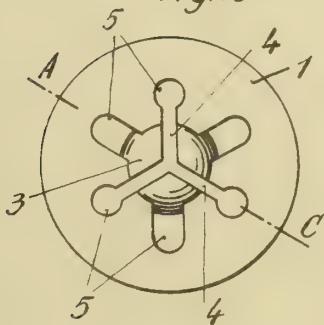
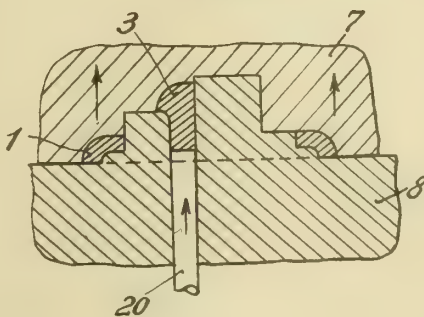


Fig. 14



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ALIEN PROPERTY CUSTODIAN

TOY BUILDING SET OF METAL

Carl Markes, Gustav Boehme and Rudolf Griessl,
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Property Custodian

Application filed February 19, 1940

This invention relates to a metal building set for children.

In the known toy building sets of metal comprising structural units that can be screwed together with the aid of uniformly spaced standard bolt holes the units chiefly consist of bars of different length from which the models to be built are assembled in skeletonlike fashion by means of screws and nuts. Building sets of this type are, however, open to the objection that they are relatively expensive and require for assembling a large number of screws the insertion and tightening of which is quite bothersome and takes up much time. Furthermore, even if closely arranged the bars or rods fail to produce a good surface effect, since the joints between the rods and the numerous bolt holes or inserted screws break the continuity of the surface, so that a miniature reproduction, particularly of objects having plain unbroken faces, frequently does not look like the original.

Proposals to the effect to improve the surface impression by the use of cardboard sheets furnished with the sets are mere makeshifts, because cardboard is subject to rapid wear and cannot serve as material for structural supports.

The invention eliminates the drawbacks mentioned by a combination of features one of which consists in employing as structural members differently colored supporting plates that are solid or appear to be so and are provided with standard perforation along their edges. These plates permit the erection of structures giving an impression of solidity and serve also as supporting members for taking up forces acting in the plane of their surface. Whereas in surfaced structures made from rods without diagonal bracing the transverse forces developing therein cause displacement of the rods relative to one another, these forces are now taken up by the plates which are real supporting units and do not require separate diagonal bracing. A proper color scheme, including for instance white, red and green, produces contrasts that please the eye.

Additional structural members according to the invention are perforated bars provided on one longitudinal edge with a narrow flange for embracing the edges of the supporting plates. In models having girderlike parts these bars form the top and bottom booms which are connected by the plates, so that the flanging engagement and a few screws suffice already to produce a rigid joint. This is due to the fact that the plates, with their long edges, are supported by

the bars or one another and thereby prevent relative motion of the joined members.

Each set further includes connecting means comprising steep-pitch screws and punched sheet metal nuts or plane or angular punched sheet metal straps serving as nuts and having at least two screw holes, each nut member possessing only one thread. The use of such connecting means simplifies and accelerates assembling, which, moreover, being punched, are cheaper than the cut threads of the screws and nuts hitherto employed in toy building sets and can be produced at a saving in material.

The straps containing at least two nuts make it possible also to assemble completely closed structures like cubes, the screws of the plate to be put on last engaging without fail the strap members located inside the structure. Being nuts themselves, the straps render the use of the usual kind of nuts unnecessary. When two building units of the known type were to be butt-jointed, it was done until now with the aid of three different connecting members, viz. straps, screws and nuts, whilst a connection according to the invention requires only two members, since strap and nut form a unitary element.

A particularly advantageous form of such a nut or strap-nut is obtained by making the thread part of a bulge pressed out of the plane of a sheet and thereby permitting springing of the connecting members when the screw is tightened, so that either the bulge moves elastically inward or the edge of the hole of the unit to be fastened is drawn into the clearance of the bulge. At any rate, the connection thus established is perfectly joltless, the bulge acting in the manner of a check nut.

The heads of the steep-pitch screws possess a square indentation to be engaged by a screwdriver having a square end. This tool is part of the equipment of each set and serves for preventing injury to colored building units which are easily damaged when ordinary slotted screw heads and wedge-pointed screwdrivers, which slip off frequently, are used.

The realistic representation of some models, such as motor cars, can be facilitated by furnishing each set with supplementary parts like engine hoods, mudguards, etc.

The invention is illustrated by way of example in the accompanying drawings comprising Figures 1 to 34.

Figs. 1 to 10 show preferred forms of supporting plates. The squares 1 shown in Figs. 1 to 3 and the triangles 2 shown in Figs. 7 and 8 have

for instance an edge length of 60 mm. The rectangular plates 3 shown in Figs. 4 to 6 have edge lengths of 60 mm. and 30 mm., and the plates 4, 5 shown in Figs. 9 and 10 have an edge length of 30 mm. It is possible of course to make use of other forms, provided the edge length fits into the system chosen. The plates are either solid or have one or more windowlike clearances 6 which do not reduce the necessary strength and which not only do not interfere with the surface effect aimed at but enhance it. The surface effect is further improved by painting the plates in contrasting colors, as white, red, green, etc.

The holes 7 near the edges of the plates have an internal diameter of approximately 3 mm., and their distance a from one another follows from the fundamental geometrical unit of the plates, i.e. a square, and amounts in this instance to 15 mm. The row of holes is removed from the edge of the plates to the extent of the distance b which is equal to 5 mm.

Figs. 12 to 15 show examples of the bars 8 forming girder booms and possessing at one longitudinal edge a flange 9 for embracing the edges of the plates in an accurately fitting manner. The lengths of the bars 8 are, respectively, 60, 120 and 180 mm., and the holes 7 as well as the distances a and b correspond to those of the plates.

Figs. 16 to 19 show longitudinally slotted bars 10 and angles 11 which as to their dimensions are adapted to the standard chosen.

Fig. 20 is a side elevation and plan on an enlarged scale of a screw 12 having three steep-pitch threads and in its head a square indentation 13.

Fig. 21 shows the associated screwdriver 14 fitted with a square working end. The screw 12 requires only a few turns for tightening.

Figs. 22 to 24 illustrate, in side elevation and plan, punched sheet metal nuts in the form of angles 15, plane straps 16 or single nuts 17 provided with a handle 18. Each strap has at least two bolt holes 19 fitted with a single thread which is produced by radially cutting the thread during punching and then twisting it.

Fig. 25 shows a nut construction on an enlarged scale. A peculiar feature of a nut according to the invention is the arrangement of the thread in a bulge 20 pressed out of the plane of the sheet metal. A strap may have more than two bolt holes and be provided also with facilitating openings 21. The handle 18 of the nut 17 may be formed of two upwardly bent opposite sheet metal edges, though handling is facilitated by bending over extended edges so as to form a bow, as indicated by broken lines.

Fig. 26 illustrates how the structural units according to the invention may be used. A surface or a girder is assembled from four bars 8 and several supporting plates 1, 3 with the aid of only four screws for each pair of bars 8, since only the ends of the bars 8 need be connected with the supporting plates 1, 3. In the structure shown four screws could be dispensed with if one long bar were to replace two butt-jointed bars above and below. For these connections screws 12 of the usual type provided with nuts 17 can be used.

Fig. 27 contrasts the representation shown in Fig. 26 and a representation of the same model in the old way by means of perforated bars. The difference in the amount of work and material required is apparent, and the general effect is also totally different.

As indicated particularly by the following examples, the invention affords an opportunity of building a very extensive range of models and of reproducing practically everything in the field of actual engineering in perfect form. This applies especially to buildings of technical character whose chief feature is a steel frame. Models built by the new toy set can, furthermore, be quickly assembled and taken apart again.

Fig. 28 shows a rectangular hollow body composed of two members 1 and four members 3 with the aid of twelve angular straps 15 and twenty-four screws 12, the faces 1 being white and the faces 3 red. By means of the strap-nuts 15 a structure of this type can be readily assembled.

Fig. 29 illustrates a chair made according to the invention from two longer and four shorter red slotted bars 10, two white supporting plates 1 and 3, six strap-nuts 15, two nuts 17 and ten screws 12 or a total of twenty-six units.

The chair shown in Fig. 30 is made from structural units of known toy sets and requires in its construction twelve perforated bars 21a, four perforated angles 22, eighteen screws and eighteen nuts 23 or a total of fifty-two units, which is twice the total needed for making a chair according to the invention.

Figs. 31, 32 are, respectively, a side and bottom view of a motor truck assembled according to the invention. The engine hood, driver's cab and car body are made from white supporting plates 3, 4, red bars 8, screws 12 and strap-nuts 15, 16, a few slotted bars 10 being used for mudguards and bumper bar and also a few screws with nuts 17 as indicated. The substructure is assembled in girderlike fashion from bars 8, slotted bars 10, slotted angles 11 and screws 12 and nuts 15, 17. The figures indicate the extremely pleasing reproduction of the model. In this connection it should be observed that the bars 8, if used for instance together with slotted bars 10 and slotted angles 11, produce extremely strong structures showing great resistance.

The wheels 24 and the axles 25 may form part of the special equipment of a set.

Fig. 33 shows a building serving for instance as railroad station or for airport purposes and clearly disclosing the remarkable surface effect of the plates 1, 3, 4 and the extremely economical use of screws 12 as a result of the employment of the supporting plates and of the bars 8. The nuts 15, 16, 17 are mostly located inside the structure. The shaded portions are red and contrast with the white of the other faces.

The members forming the toy set are arranged in the usual manner in a box 26 shown in Fig. 34. Supplementary units, as engine hood, mudguards for motor cars, etc., may also be kept in the box or supplied in separately purchasable boxes.

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Fig. 1

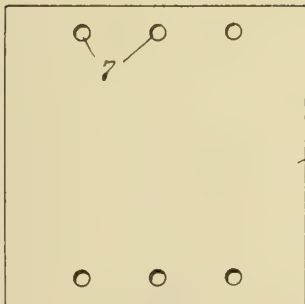


Fig. 2

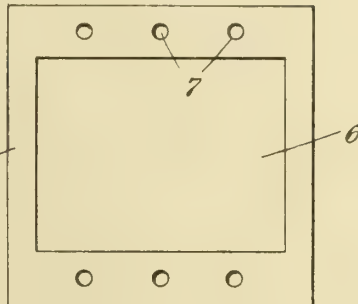


Fig. 3

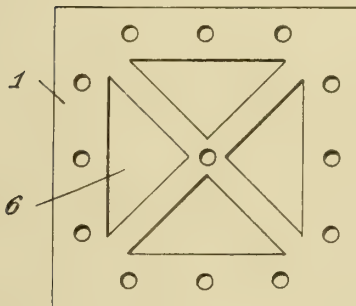


Fig. 4

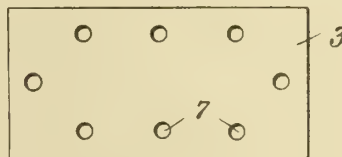


Fig. 6

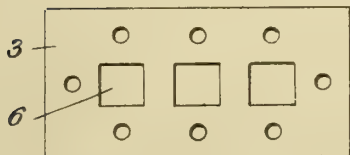


Fig. 5

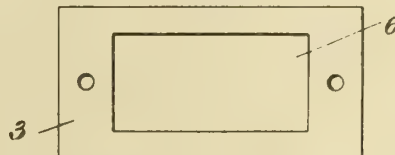


Fig. 7

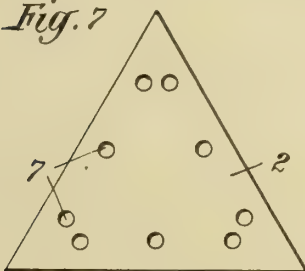


Fig. 8

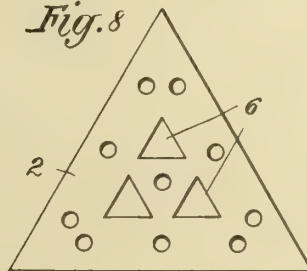


Fig. 9

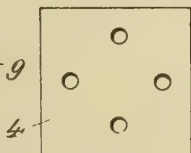
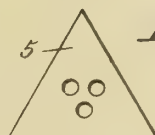


Fig. 10



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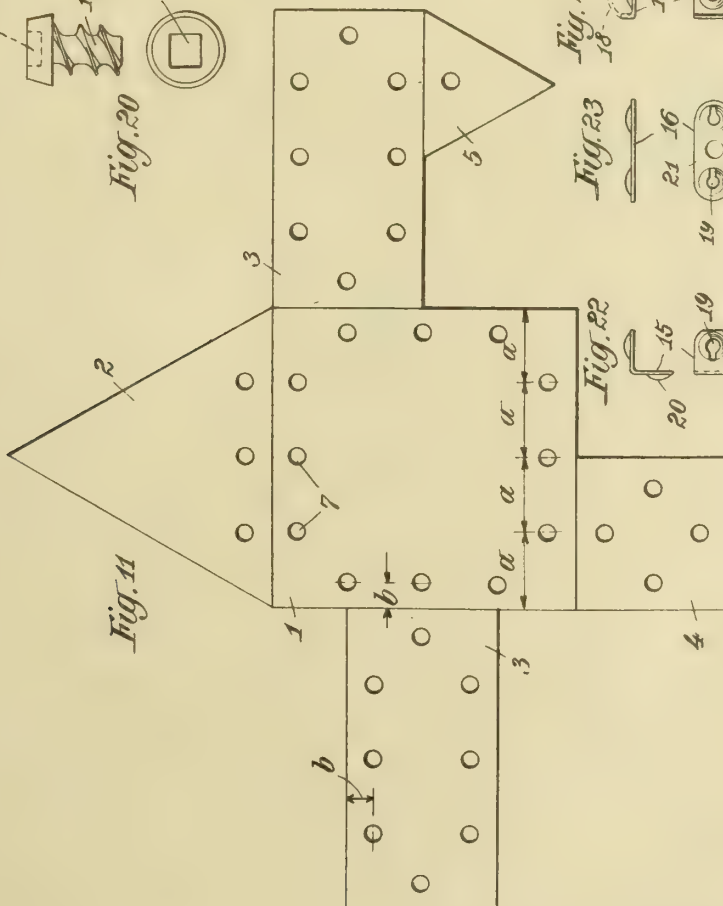
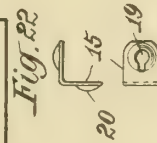
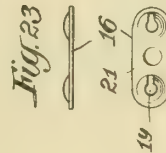
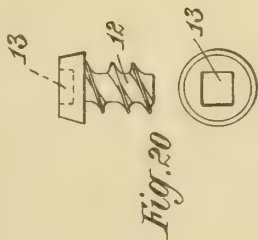
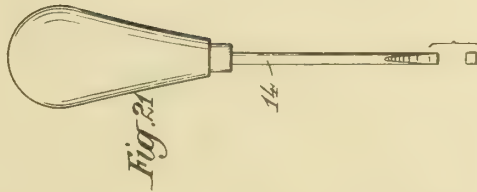
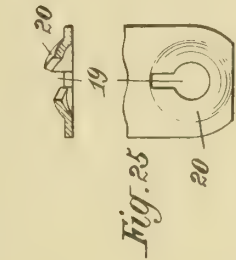
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TOY BUILDING SET OF METAL
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5 Sheets-Sheet 2

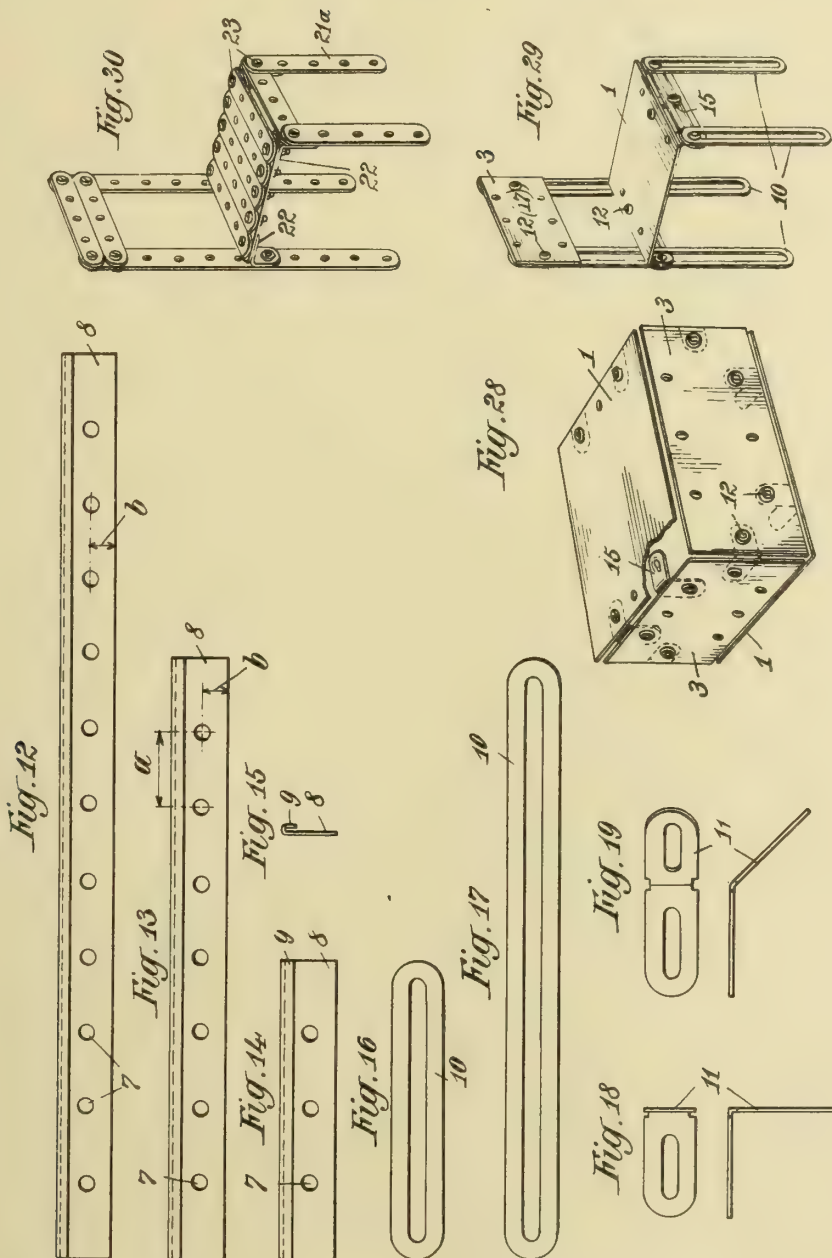


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Fig. 26

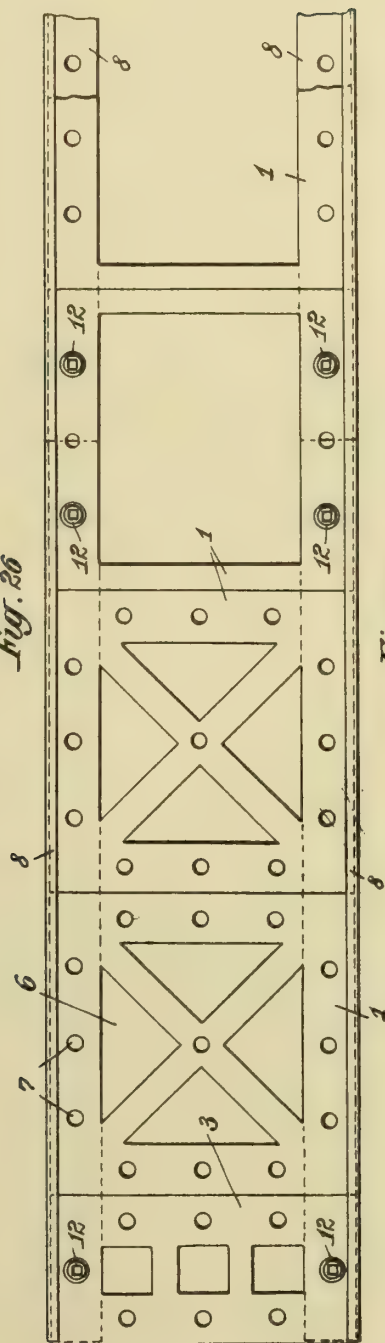
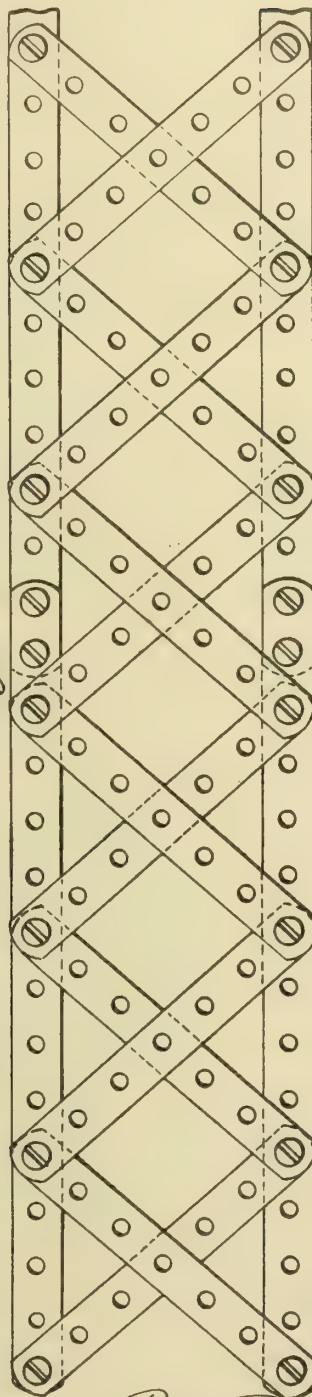


Fig. 27



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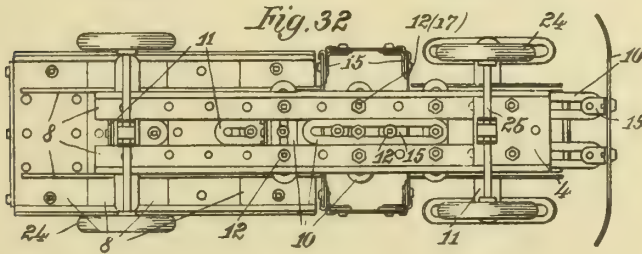
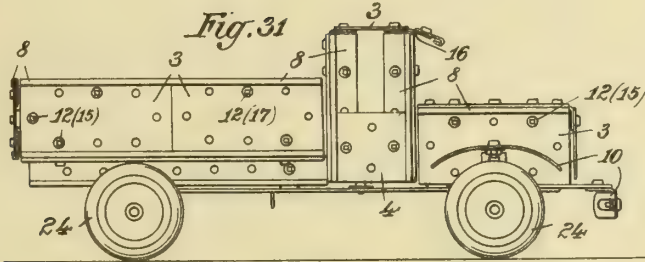


Fig. 34

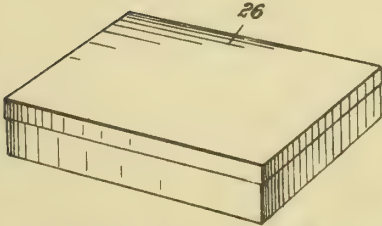
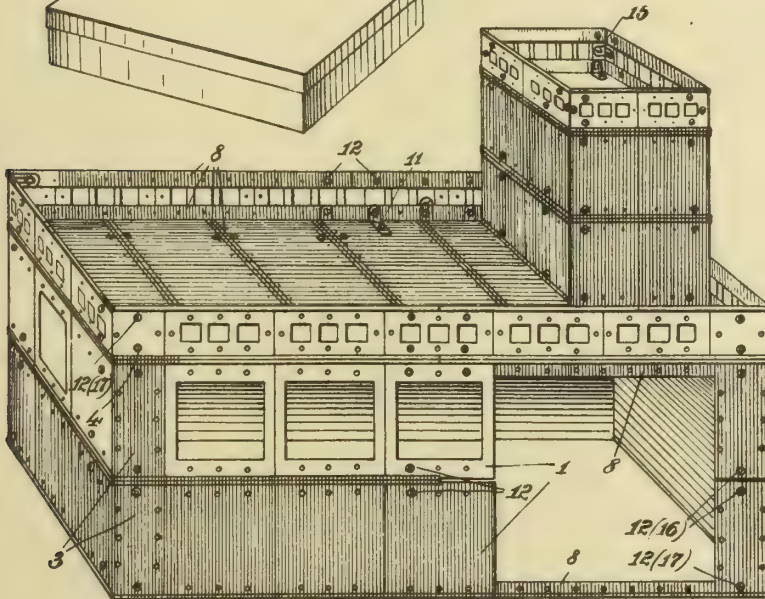


Fig. 33



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ALIEN PROPERTY CUSTODIAN

REFRIGERATING APPARATUS

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Application filed February 21, 1940

The present invention relates to a refrigerating apparatus and particularly to refrigerating apparatus of the absorption type.

The principle upon which the refrigerating absorption apparatus is founded, is well known: according to this principle, a liquid having dissolved in it gases capable of condensing, at a rather high temperature, and evaporating by absorption of a great amount of heat, is heated in a boiler. As a result of this heating, the gases are separated from the liquid. Said gases are cooled by a water or air cooled coil and are condensed. The liquid thus obtained, is delivered for evaporation into the evaporator and the cool vapors thus produced are conveyed from the evaporator to the absorption apparatus where they are brought into contact with the liquid coming from the boiler and in which liquid they are dissolved, to start once again their cycle of operation as mentioned above.

The main object of the present invention is to provide an improved refrigerating apparatus comprising a boiler, an evaporator and an absorber, such as to render the apparatus more simple and more efficient than those of the types already known.

Another object of the invention is to provide a refrigerating system comprising an evaporator and an absorption apparatus, each enclosed in a metallic container and placed side by side on the same level and in direct communication with each other, thereby favouring the absorption of the gases in the absorber and reducing the pressure in the evaporator, so as to allow a more rapid and complete expansion of the refrigerating liquid in the evaporator.

The invention will, however, be better understood from the following description which discloses by way of an example only, and with the aid of the accompanying drawings, a constructional form that the invention may assume:

In the drawings:

Fig. 1 is a diagrammatic view of the refrigerating system according to the invention;

Fig. 2 shows a plan view of the radiating system with which the absorption apparatus is provided;

Figs. 3 and 4 show respectively a plan view and an elevation of one of the helicoidal members with which the absorber and evaporator are provided.

Fig. 5 shows a diametrical section of said member;

Fig. 6 shows a section, on an enlarged scale, of the boiler.

Referring to the drawings (Fig. 1), 1 represents the boiler, 2 the conduit through which the refrigerating gas is delivered to the cooling coil 3, in which it is condensed. The coil 3 may be either air cooled or water cooled.

The refrigerating liquid thus obtained, is delivered to the evaporator 8, through the tubes 4 and 5. Here, it is not brought to evaporate immediately, but for the purpose of cooling it further, it is forced to pass through the conduits 6, 7 and 6' and therefore to drip onto the uppermost helicoidal member 9.

The evaporator 8 comprises an external metallic container which, as illustrated in the drawing, is cylindrical and in the inside of which a number of helicoidal members are arranged. The peripheral portions of said members are in tight contact with the walls of the container, while in their central zone said members are provided with a hole which will allow them to be fitted onto the central and hollow cylinder 22. These members 9 are disc-shaped, but they have a sector cut off, as shown in Figs. 3, 4 and 5. They are also provided with a peripheral rim 26 bent upwards and with the grooves 27 on their upper surfaces. The rim 26 has the purpose of ensuring a tight contact between the discs 9 and the container 8, while the grooves have the purpose of leading the refrigerating liquid in its downward trend into the interior of the evaporator.

These helicoidal members 9 are similar to the members 12 of the absorber 11, but these latter are complete and assembled on the central cylinder 25, so as to constitute a continuous helix device.

As these elements are in perfect contact by means of their peripheral rim with the outer cylindrical container 1, they form a helicoidal passage into the absorber 11, in which the liquid coming from the boiler and the gas from the evaporator, flow in the opposite direction, as it will be further explained hereinafter.

The evaporator 8 also contains, in its lower region, flat discs 23, which are provided with holes, the purpose of which will be further explained hereinafter.

The elements 9 in the evaporator 8 are not arranged alongside each other, as it would be in the case of the absorber 11, but are maintained spaced apart a small distance from one another, so that the refrigerating liquid which flows on them will drip from one onto the other, in order to favour the evaporation of said liquid.

The conduit 7 is not connected to the lower ends or extremities of the tubes 6 and 6', but

somewhat higher up, and this for the purpose of providing two lower blind portions of the tubes 6 and 6', into which all the dirt and impurities which the refrigerating liquid may carry along with it, may be collected.

The refrigerating liquid which, as already stated, drips from the outlet of the tube 6' onto the upper member 9, passes successively onto all the helicoidal members 9 and as it is flowing on its path, it evaporates and abstracts heat from the medium which must be cooled. The cold and heavy gas thus formed, collects in the lower region of the evaporator 8 and is delivered to the absorber 11 through the conduit 10. Here it finds the surfaces of the discs 23 wet with liquid and starts to dissolve again in same; it then runs the helicoidal path established by the members 12, while the same path is followed in the opposite direction by the liquid coming from the boiler. In such a way, a further absorption of the gas by the liquid is obtained, so as to obtain again the original solution, which is then sent back into the boiler. To return said solution into the boiler again, the solution is forced, after having passed the holes of the discs 23 which operate also as filters, to pass through the tube 16 and through the space between the two concentric coils 13 and 14 and then it is delivered to the boiler through the tubes 16', 17 and 28, and the above described cycle is repeated.

On the other hand, the liquid coming from the boiler and being deprived of substantially all the gas dissolved in it, circulates in the coil 13, which is the inner of the two coils mentioned above. The purpose of these two concentric coils is that of causing advantageous exchanges of heat between the two liquids with the maximum utilisation of the heat supplied to the boiler. In fact, the liquid passing through the coil 13, is very hot, and in order to make possible the dissolution of the refrigerating gas in said liquid, it is necessary to lower the temperature of the liquid. Now, the solution containing the refrigerating gas and leaving the apparatus 11 is relatively cold, but it must be reheated, in order to develop the refrigerating gas, so that a heat exchange between these liquids will be very desirable and increase the efficiency of the system.

The liquid having passed through the coil 13, flows into the radiating tubes 13' provided with radiating fins 15, thereby entering the absorber 11 at the required temperature.

The gases, that will remain in their gaseous state in the absorber 11, will not easily pass in solution into the liquid used in the system. They are heated by the heat generated by the dissolu-

tion of the gas in the liquid and collected in the higher regions of the absorber 11, and they leave the absorber through the conduit 19 and are conveyed to the evaporator through the passage 20 which surrounds the tube 10. The cold refrigerating gas flowing into the tube 10 from the evaporator into the absorber, will cool the inactive gases. These are further cooled by leaving them to expand in the chamber 21, which is in communication with the hollow cylinder 22 in turn communicating in its upper region with the interior of the evaporator.

The boiler 1, illustrated in detail in Fig 6, comprises a cylindrical body, within which is provided an inner tube 30 tightly connected with the cylindrical body and in which the source of heat is located. Said source of heat may be an electrical resistance or any other suitable source. The lower part of the tube 30 is surrounded by a tube 17 tightly sealed at its ends onto the tube 30 and having its lower portion in communication with the tube 16' and its upper portion with the tube 28, which runs along the whole length of the boiler and opens out in the upper part of the same, that is to say, above the level A—B normally reached by the liquid in the boiler. The liquid which has absorbed the refrigerating gas in the absorber, reaches the compartment between the tubes 30 and 17 and must not get mixed up with the liquid deprived of said gas and collected in the lower region of the boiler.

The liquid containing the gas in solution is greatly heated in the tube 17, thereby allowing said liquid to rise into the tube 28 and to enter the boiler from above, where it is again deprived of its refrigerating gas, which will leave the boiler 1 again through the conduit 2.

32 is one of the metallic pointed stems fixed onto the boiler and which should always remain in contact with the liquid for the purpose of regulating the ebullition in the boiler, which may otherwise become too turbulent.

In order to facilitate the absorption of the gas in the absorber, said absorption being favoured by a rather low temperature, the absorber 11 is provided with radiating fins 24. These fins may be fitted onto the container of the absorber in any suitable way, for instance by means of two sectors 34 fixed onto the container by bolts 35 shown in Fig. 2.

Naturally, in order to allow the various fluids to circulate as necessary, circulation pumps may be placed at suitable points in the circuit, as it is common use in these systems.

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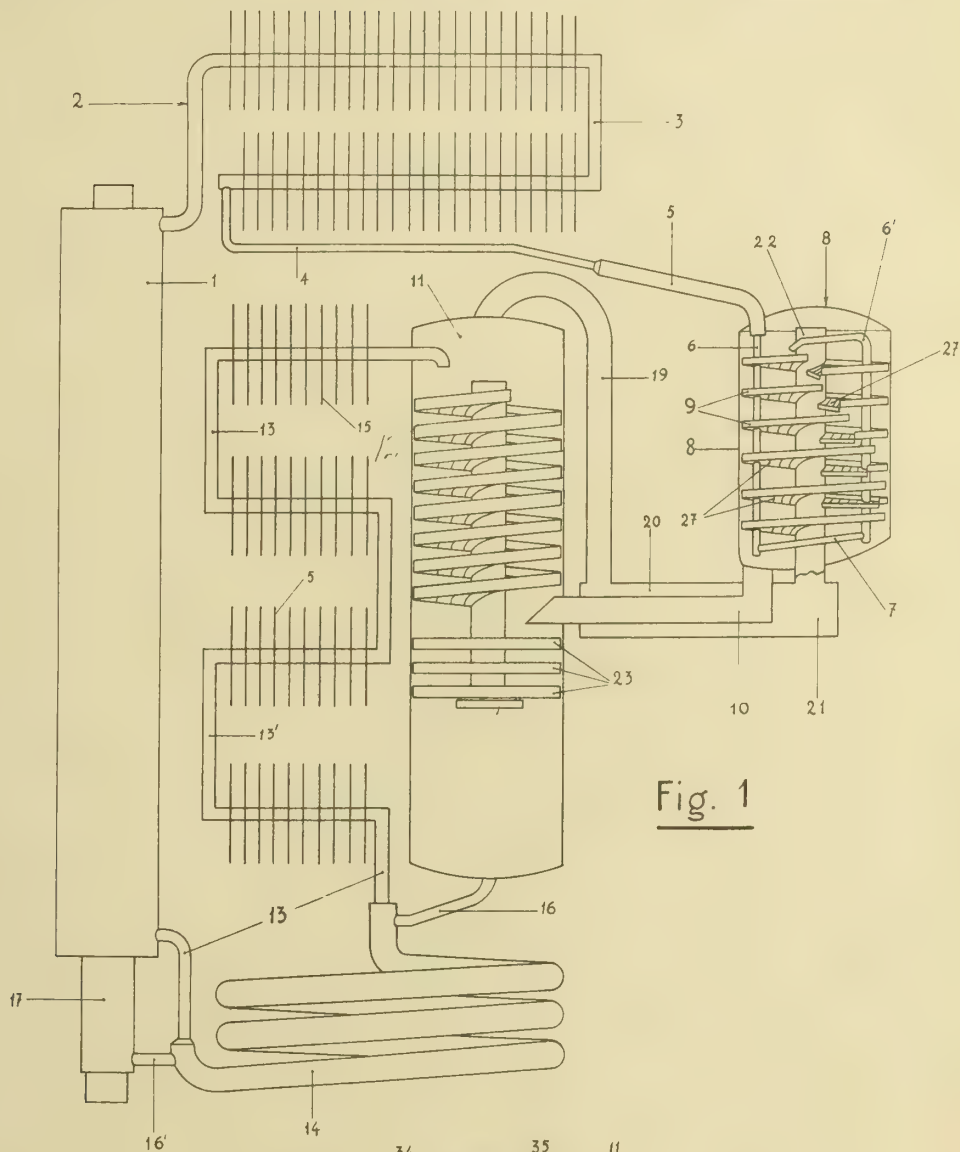


Fig. 1

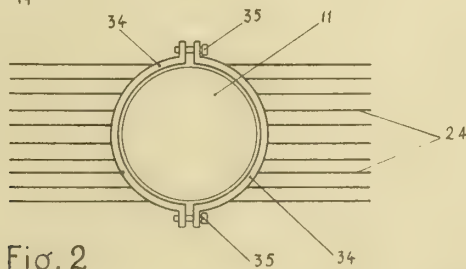


Fig. 2

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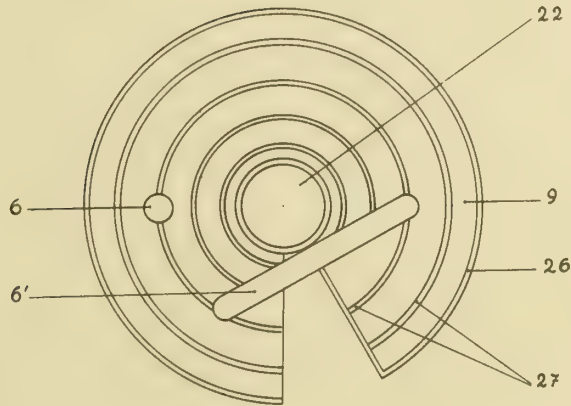


Fig. 3

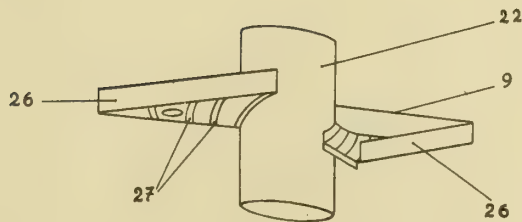


Fig. 4



Fig. 5

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3 Sheets-Sheet 3

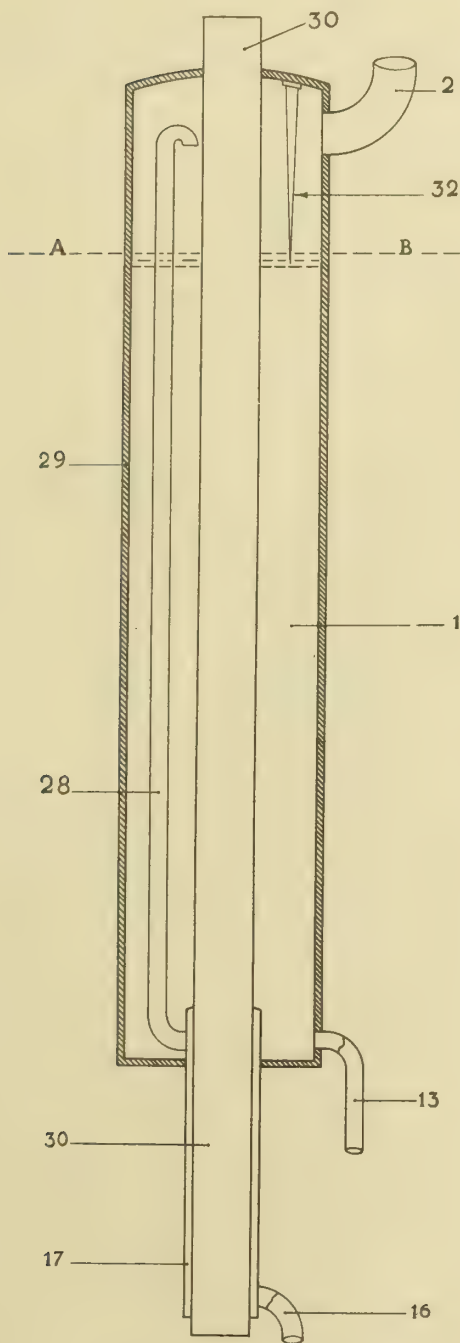


Fig. 6

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ALIEN PROPERTY CUSTODIAN

MANUFACTURING FIBRO-CEMENT PIPES

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Alien Property Custodian

Application filed February 21, 1940

This invention relates to a method of centrifugally moulding fibro-cement pipes, such as asbestos-cement pipes, and an apparatus therefor.

Centrifugal moulding has already been employed for manufacturing hollow concrete piles, but it has not heretofore been suggested to apply it to the manufacture of fibro-cement pipes. Researches and experiments carried out by applicant have shown that centrifugal moulding is the best process for manufacturing fibro-cement pipes, as centrifugation surprisingly improves feltering of the fibres, so that the centrifugated tube immediately takes a consistency such that it can be stripped from the mould before the cement has set.

According to this invention, the material is fed to the mould in the form of a ribbon, which is helically coiled on the mould wall. During feeding the mould is rotated at a relatively low speed, as 1000 turns per minute, which varies according to the diameter of the tube, in order to avoid too high centrifugal forces which would lead to a stratification of the constituents of the mass. On completion of feeding, the rotational speed is increased to twice or three times the initial number of turns (for instance to about 3000 turns per minute) in order to separate the mixing water and compress the material.

By utilizing the property of the fibro-cement pipe according to this invention to maintain its shape before the setting of the cement, as soon as it is stripped out of the mould the pipe can be advantageously subjected to a compression in order to further improve its strength. For this purpose it is placed on a mandrel having the same diameter as the final desired pipe diameter and a thoroughly smooth surface, and it is brought in this condition into an apparatus in which it is subjected to a centripetal compression with hydraulic or pneumatic means. This gives a pipe of a highly compact structure, which is much stronger than pipes obtained by the known methods of manufacture and has a perfectly smooth inner surface.

It has already been proposed to subject cement pipes to hydraulic or pneumatic compression operating from the inside towards the outside. This compression in a centrifugal direction unavoidably causes an expansion of the inner surface of the tube being formed, which gives rise to unevenness and discontinuities that are exaggerated, in the case of fibro-cement, by the presence of fibres.

This drawback is fully eliminated by the centripetal compression according to this invention.

The accompanying drawing shows, by way of example, a simple apparatus for carrying out the process according to this invention.

Figure 1 is an axial section of the mould; Figure 2 is an axial section of the feed device; Figure 3 is a section on line III—III of Fig. 1; Figure 4 is a top view of the feed device; Figure 5 is a view from underneath and Figure 6 is an axial longitudinal section of the centripetal compression device.

Referring to the drawings, 1 denotes a support having mounted thereon on ball and roller bearings the base plate 2 provided with a drive pulley 3 and to which a tubular member 4 adapted to support the mould 5 is fixed.

The tubular member 4 is kept centered as it revolves at high speed by means of rollers 6 mounted on pivots 7 fixed to a platform 8 and is provided with a circular row of centering screws 9 engaging with an annular row of projections 10 having an upwardly flared outer conical surface. The mould is further kept centered at the bottom by means of the conical seat 11 in the base plate, receiving the conical bottom 12 of the mould. The seat 11 is formed with ducts 13, through which the excess water from the material is discharged to the outside through the central bore 14 in the support. For this purpose the mould 5 is provided with radial holes 15, so that during centrifugation the excess water flows into the annular space 16 between the mould and mould carrier and, as soon as the action of the centrifugal force ceases, it flows down to the outlet.

The mould 5 is locked in position simply by means of the cap 17 screwed on the mould carrier so that, as feeding is completed, it may easily be withdrawn by removing the cap and slightly rotating the mould in order to clear the projections 10 from the screws 9.

A feeding container 18 is provided above the mould carrier and is mounted for vertical displacement on guide columns 19.

The material is fed by a long tube 20 ending by a delivery nozzle 21 and axially reaching within the mould 5. The material is forced through the nozzle by means of a piston 22 slidably mounted in the container and operated by an electric motor 23 which drives a worm wheel 24 screwed on the threaded rod 25 of the piston.

Under the action of the piston 22 the material is extruded through the nozzle 21 arranged with its axis in a horizontal direction and is forced in the form of a ribbon towards the wall of the mould, on which it deposits by effect of the ver-

tical displacement of the container and nozzle in a coiled form and is compressed by the centrifugal force so as to form a uniform layer in which the fibre has undergone a thorough feltering process, so as to bind together the cement particles and make the tube consistent enough to enable its removal from the mould as soon as it is formed.

The ratio between the speed of the motion of the container and the speed at which the material is extruded controls the thickness of the tube wall. Obviously, however, this thickness may be reached by one or a plurality of strokes of the distributor; in the latter case the fibres will be disposed along superposed coils, that may be alternatively right-handed and left-handed by suitably reversing the direction of movement of the container.

Of course, hydraulic or pneumatic means may be employed instead of the piston for feeding the material, or the gravity alone may be utilised.

When the pipe has reached the desired thickness, the mould is withdrawn with the pipe from the mould-carrier, the pipe is stripped from the mould and, if necessary, it is placed on a mandrel and brought to the compressing apparatus shown in Figure 6.

This apparatus consists of a frame comprising a lower bulkhead, columns 27 and an upper bulkhead 28, and a tubular member 29 that may be secured to the frame by means of the set screw 30 provided with a hand wheel.

A hose, for instance of rubber, is arranged in the bore of the tubular member 29 having the same profile as the outer surface of the pipe to be manufactured. Under normal pressure the hose has an inner diameter smaller than the outer diameter of the finished fibro-cement tube, in order to avoid wrinkles during the compressing

operation. To enable the tube under manufacture, which is of a larger diameter, to be placed into the hose, the space between the hose 31 and tubular member 29 is evacuated; as the latter expands, a space is left free for introducing the fibro-cement tube 32.

As soon as the tube 32 is stripped, it is inserted into the tubular mandrel 33, which is then introduced into the expanded hose 29 and clamped by means of the screw 30 between the covers 34 and 35; the latter serve also for tightly securing the hose to the ends of the tubular member 29.

As the tubular member 29 together with the tube 32 is mounted into the frame a liquid or a gas under the desired pressure is supplied to the space between said member and the hose, so as to compress the material in a centripetal direction against the mandrel. With this operation the material is strongly compressed, thereby considerably improving feltering of the fibres and making the structure very compact and strong.

The mandrel 33 is provided with holes for the discharge of the excess water in the material, which is thus freely exhausted through the axial bore 36.

After compression and after the cement has set, the pipe 32 is submitted to the usual reaming operation for forming the socket joint.

The inner wall of the finished fibro-cement tube is also advantageously provided either by electrolysis, atomizing or any other suitable process with a metallic coating, in order to reduce the resistance to the flow of liquids or gases, make the wall fully water-tight and avoid any contamination or alteration of the fluids or gases conveyed by the tube.

GIOVANNI GUERCI.

Fig. 1

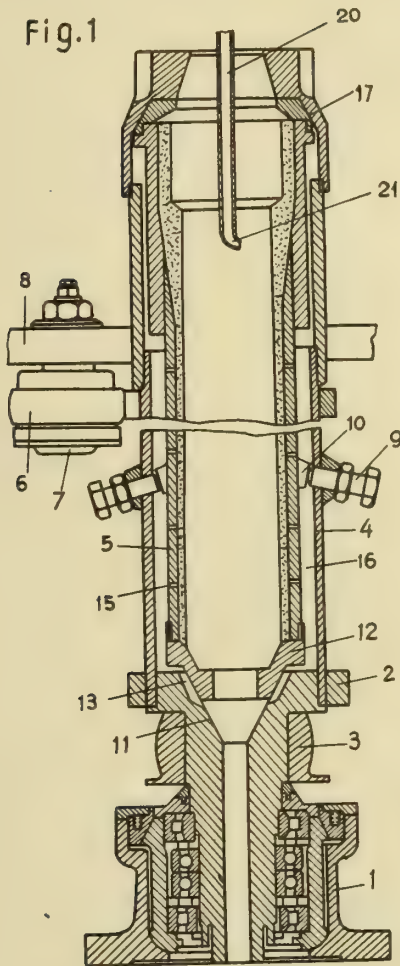


Fig. 6

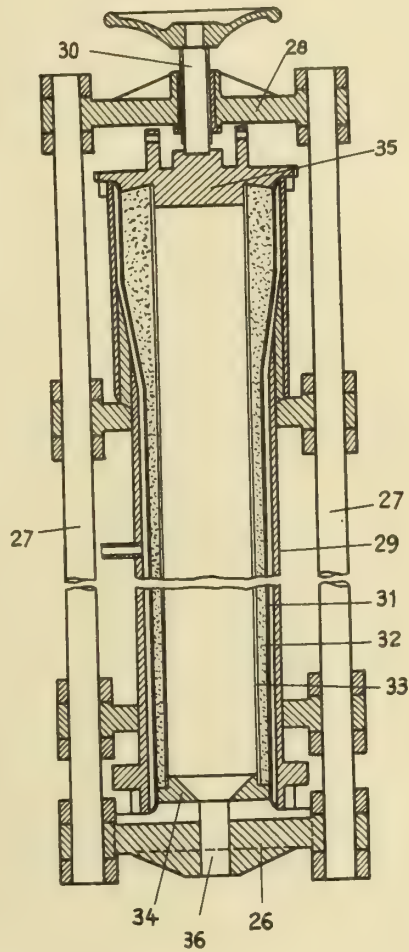
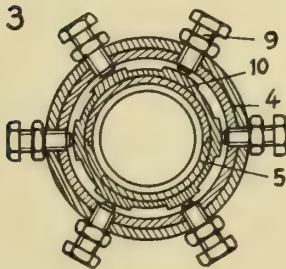


Fig. 3



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ATTYS.

PUBLISHED
APRIL 27, 1943.

G. GUERCI
MANUFACTURING FIBRO-CEMENT PIPES

Serial No.
320,199

BY A. P. C.

Filed Feb. 21, 1940

2 Sheets-Sheet 2

Fig. 2

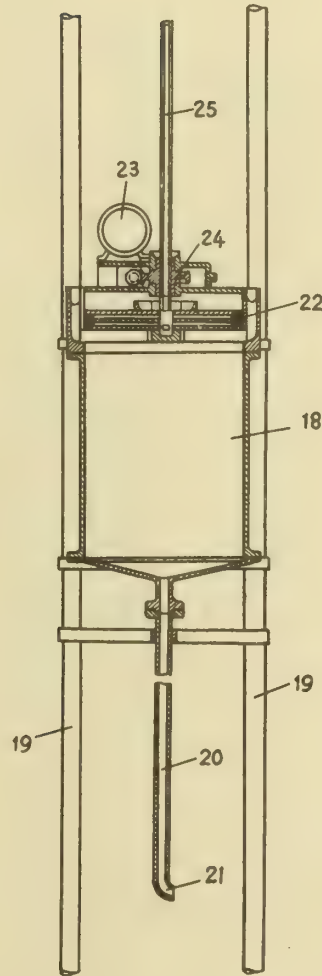


Fig. 4

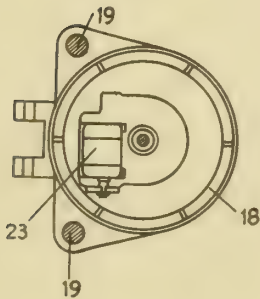
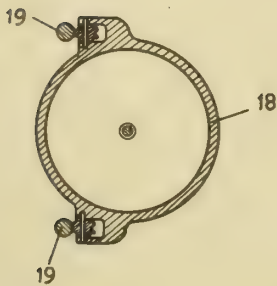


Fig. 5



Inventor,
G. Guerci

By: Glascock Downing & Peck

ALIEN PROPERTY CUSTODIAN

METHOD OF DRYING SHEETS

Hermann Basler, Berlin-Dahlem, Germany;
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Application filed February 27, 1940

The present invention relates to a method of drying sheets, particularly fibre pulp sheets, between heated pressure plates. Eventually vacuum is used when employing the new method. In carrying out such methods it is known to subject the sheets to be dried and arranged in a press in the manner of a staple to a temporarily released or variable pressure and thereby to aerate all sides of the staple. It is, moreover, known to treat an individual sheet to be dried in a press, whereby the pressure temporarily is released either by lifting one of the pressure plates or by alternate lifting of both pressure plates. In this staple-like treatment of the material to be dried by employing variable pressure an effective aeration of the entire surfaces of the material to be dried cannot be obtained particularly not in case of material having a large surface and sheets of considerable thickness. The danger, moreover, exists that an effective aeration mainly is obtained at the outer edge parts of the individual sheets. With this method as well as with all other known methods the material to be dried or the blank remains upon a heated or hot support if the press is opened so that a non-uniform aeration and heating occurs. This causes a one-sided and unsufficient drying of the material so that warping of the latter cannot be avoided.

The object of the invention is to provide a method and a device for carrying out the method by which the drawbacks of the known devices are removed. The invention differs from the known art mainly in removing each individual sheet of the material to be dried and holding same in a freely suspended state between the pressing operations for obtaining aeration from all sides. By this method a uniform aeration of all sides of the blank is obtained so that the drying operation not only is accelerated and improved, but also is effected uniformly in such a manner that warping of the material to be dried cannot occur. The material to be dried is lifted off the hot pressure plates so that a one-sided heating cannot be effected and also the so-called after-evaporation is effected pressureless, because no additional heat is supplied to the material to be dried.

In a manner known per se vacuum also may be applied when carrying out the method according to the invention in spite of the fact that the above mentioned advantageous effects are obtained if the method is carried out without using vacuum.

The device for carrying out the method according to the invention is so constructed that during aeration the pressure plates themselves suspend-

ingly hold the sheet to be dried between them. Hereby a particularly simple device is provided for carrying out the new method.

When using vacuum for withdrawing the dry steam the pressure plates engage into each other by a notch and spring extending all around the pressure plates. Moreover, suction channels are provided which discharge into the spaces between the pressure plates. The latter, moreover, may be provided with shiftable carrier frames which during aeration serve to carry the material to be dried between the pressure plates. Preferably the upper surfaces of the pressure plates are provided with recesses into which the carrier beams of the carrier frame engage in closed condition for instance during pressing, whereas the lateral sides of the carrier beams are guided and held by slots and pins in openings provided at the lower side of the pressure plates.

The press may otherwise generally be constructed in a well known manner. A detailed description of the press is not necessary, because the general construction of same forms no part of the subject matter of the invention.

One device for carrying out the method according to the invention is shown by way of example in the accompanying drawing in which:

Fig. 1 shows a broken away section through two superimposed pressure plates with intermediate material to be dried in the heated state and with press closed,

Fig. 2 is a section similar to that of Fig. 1 but with the press opened, and

Fig. 3 shows a broken away top plan view of one of the pressure plates.

The pressure plates 1, 1a and so on are provided at the upper surfaces with grooves 2 which render the upper surface of the pressure plates grate-like. The plates, moreover, have channels 3 for heating purposes as well as channels 4 which are connected to a suction device, for instance a pump or the like. The channels 4 branch in such a manner that both sides of the surface may be sucked off by one channel. For this purpose the channels extend into spaces 13 which are closed on the one hand by surrounding walls 5 covering the space between two pressure plates and on the other hand by the side walls of the material to be dried.

These walls 5 have a somewhat wedge-like shape and the lower portion of same is rounded off as well as provided with an indenture so that these walls tightly may engage in sealing surfaces 5a of the pressure plate arranged below them.

The upper surface of the pressure plates is

provided along two parallel sides with trapezoid-shaped recesses 10 into which engage correspondingly formed carrier beams 9a if the press is closed. Carrier members 9 are provided at the ends of the carrier beams 9a which by means of slots 9b are suspended upon pins 11 of the superimposed pressure plate. If the pressure plates are closed, the carrier members 9 fill the corresponding hollow space 12 of the pressure plates (Fig. 1). If, however, the plates 1, 1a and so on are removed from each other, the carrier members 9 are suspended on the pins 11 and hold the material 8 to be pressed freely suspended between the pressure plates so that air may be admitted to all sides of the material to be dried (Fig. 2).

Both sides of the material 8 to be pressed are covered with a network 7 consisting for instance of wire and above this network perforated plates 6 are provided at both sides. The perforations of these plates are preferably so arranged as to align with the grooves 2 forming the grate and

the latter themselves are connected to each other by any suitable means, so that the entire grate surfaces, i.e. the entire surfaces lying above the plates effecting drying may be sucked off by the channels 4 leading into the spaces 13.

Depending on the size of the plates the suction may be effected from one or several points and depending on the other construction of the plates, the drying members and the supports, the construction of the connections in the grate compartments may be different.

As may be seen from Fig. 1, the carrier members 9 and the corresponding grooves are staggered with regard to each other and also the grate spaces may be staggered with regard to each other, or the connections with the perforations may alternately be different and the like.

The grooves 2 for instance may be connected to each other by channels 15 as has been indicated by dash and dotted lines in Fig. 3.

HERMANN BASLER.

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H. BASLER
 METHOD OF DRYING SHEETS
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 321,025

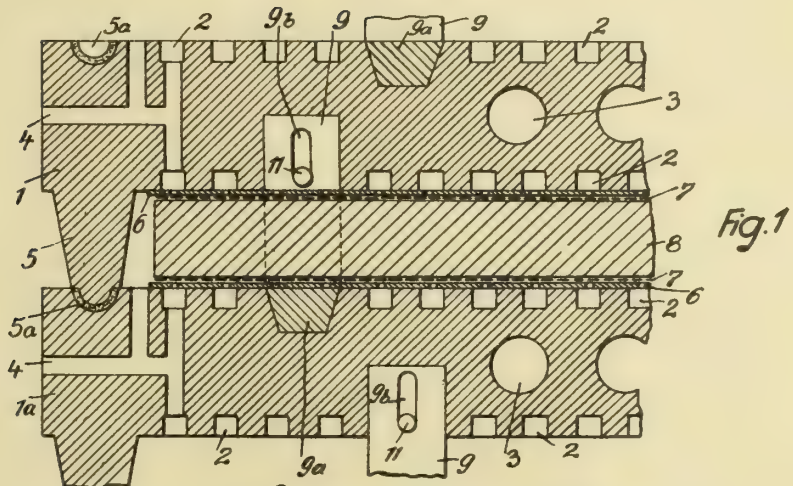


Fig. 1

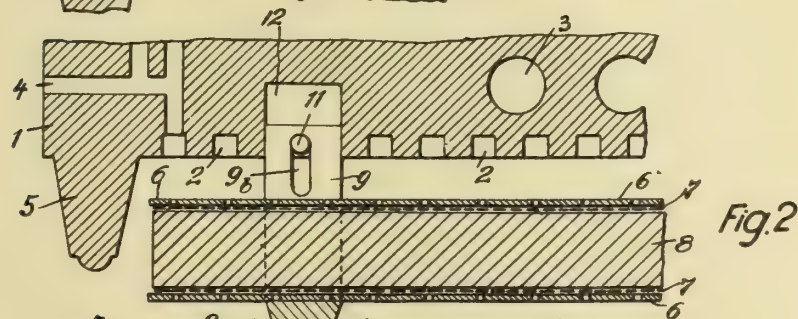


Fig. 2

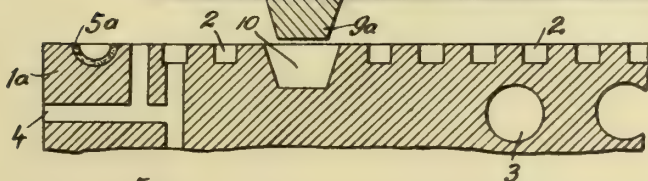
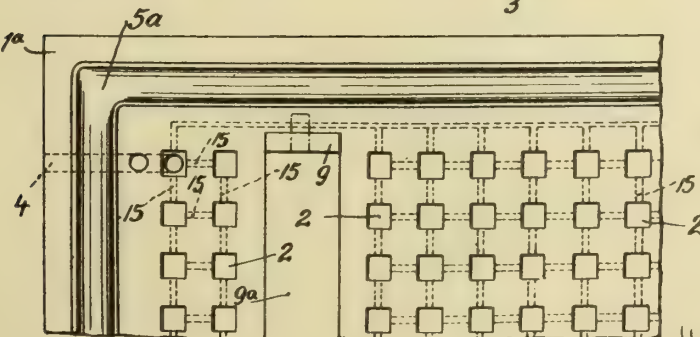


Fig. 3



Inventor.

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By

ALIEN PROPERTY CUSTODIAN

METHOD OF MASS PRODUCTION OF OBJECTS FORMED OF MOLDABLE MATERIAL HAVING EMBEDDED A PLURALITY OF SMALL PIECES

Daniel Swarovski, Wattens, Tyrol, Germany;
vested in the Alien Property Custodian

Application filed March 4, 1940

The present invention relates to a method of mass production of objects formed of moldable material having a plurality of small pieces made of other material embedded into this moldable material the upper surface of which pieces partially is freely supported. The object of the invention is to simplify the usual operation of producing such objects. As is well known these objects hitherto are made in such a manner, that the pieces to be embedded, consisting for instance of glass, metal, artificial stone masses and the like, which individually only form a fracture of the object to be deformed are inserted in a mold suitable for forming the object and are secured in the desired position by holding means, whereupon the deformable mass is introduced into the mold by a press-, press casting, or casting method so as to cover the pieces to be embedded leaving free some visible surfaces only and holding these pieces after solidification. This holding may be effected either by the adhesive capacity of the pieces embedded in the mass or thereby that the mass partially overlaps the edge of the pieces. The holding devices mentioned above which, owing to the plurality of pieces to be embedded, are formed in the manner of a grate cannot simply be applied but must themselves be held in their position to be able to completely fulfil their purpose, because otherwise on the mass penetrating into the mold the pieces to be embedded together with the holding devices are lifted and displaced out of their predetermined position.

The object of the invention is to render superfluous such special holding devices which, moreover, must remain in the mass and therefore are lost. According to the invention the pieces to be embedded are loosely inserted in cavities or recesses of a preformed body nearly corresponding in form to the final shape of the object. The mass of this preformed body later on forms the holder of the pieces. The body is then pressed in a mold corresponding to its final shape for tightly and permanently connecting the pieces to be embedded with the body. In this manner the operation also is carried out with the use of a holding device, but the latter is formed by the object to be produced itself, because the forming is effected in two stages which has the further advantage that the first forming operation may be carried out absolutely independent on the pieces to be embedded. The supposition for the operation according to the invention is, of course, that the preformed body may be subjected to a final forming which for instance al-

ways is possible by the use of so-called hot plastic masses. Therefore, for carrying out the method according to the invention particularly materials come into consideration which are rendered plastic on heating, further the so-called masses capable of being hardened when heated, i. e. such materials capable of being worked in a hot state and which may be hardened by an additional supply of heat.

The method according to the invention is particularly adapted for the manufacture of objects into which a plurality of other pieces is to be embedded, as for instance jewelries ingemmed with glass stones, metal decorations or other decorative bodies, light signals with individually embedded reflecting elements and so on.

If it is possible with regard to other points of view, the surface of the pieces to be embedded which is to be covered by the formable mass and the cavities or recesses of the preformed body preferably are of such a form that the insertion of the pieces into the recesses or cavities in mass production may easily be carried out as this may be effected by putting the pieces upon the front side of the preformed body, shaking the pieces into the depressions and aligning the insertions by smoothing down. The body preformed in a cold or hot state is then placed together with the inserted pieces into one half of a mold which for instance may be effected by tilting over the lower part of the mold and subsequent inversion of the latter, whereupon the upper portion of the mold is placed in position and pressure is exerted by which the preformed body obtains the final shape of the object to be produced.

In the accompanying drawing the invention is shown by way of example.

In this drawing:

Fig. 1 shows a section through a mold together with a preformed body and the inserted pieces in the moment before the final forming of the object, and

Fig. 2 is a section through the finished object.

The object to be produced has according to Fig. 2 the form of a plate in the front side of which rows of decorative bodies or the like are to be embedded the plane upper surfaces of which are arranged flush with the upper surface of the plate. As may be seen from Fig. 1 the preformed body 1 already has substantially the form of the plate to be produced and is provided with recesses or cavities for the insertion of the pieces to be embedded. With the same volume this body is somewhat smaller and therefore higher so that it may easily be inserted into the lower

portion 2 of the mold. The pieces 3 to be embedded which in the present case are arranged one adjacent the other with a small space between each two pieces are prisms or cones the bases of which after insertion of the pieces into the recesses or cavities project somewhat from the front surface of the body 1. The edges of the base surfaces of the pieces 3 resting upon the bottom of the mold are ground by forming of facets 4 so that between the pieces 3 and the opposite wall of the mold additional hollow spaces are formed corresponding to the removed edges.

During final pressing of the body 1 by lowering the plunger 5, forming the upper portion of the mold, all hollow spaces of the form are filled, whereby the mass overlaps the facets and the pieces 3 are particularly safely held and tightly embedded as may be seen from the finished plate 1' shown in Fig. 2.

The final deforming of the preformed body practically may also be effected in the position the body assumes for inserting pieces to be embedded. The preformed body hereby may be introduced into the lower portion of the mold with

the recesses or cavities directed upwardly in which the pieces to be embedded are loosely inserted, the upper portion of the mold brought into position from above during deforming first of all presses upon the pieces to be embedded and forces the mass flowing off below the pieces to be embedded into the still present hollow spaces thereby tightly embedding the pieces. In certain cases it is to be preferred to finally deform the body in the first operation except the embedding side, whereupon in a second operation the mass particles directly surrounding the decorations to be embedded are once more heated, finally deformed under pressure and eventually hardened, if this is necessary for holding the inserted pieces.

It is evident that the method according to the invention has substantial advantages by rendering superfluous special holding devices for the pieces to be embedded, by shortening the period of operation and by excluding influences which may lead to defective work, i. e. circumstances playing a great roll in mass production.

DANIEL SWAROVSKI.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

D. SWAROVSKI
METHOD OF MASS PRODUCTION OF OBJECTS
FORMED OF MOLDABLE MATERIAL HAVING
EMBEDDED A PLURALITY OF SMALL PIECES
Filed March 4, 1940

Serial No.
322,152

Fig. 1

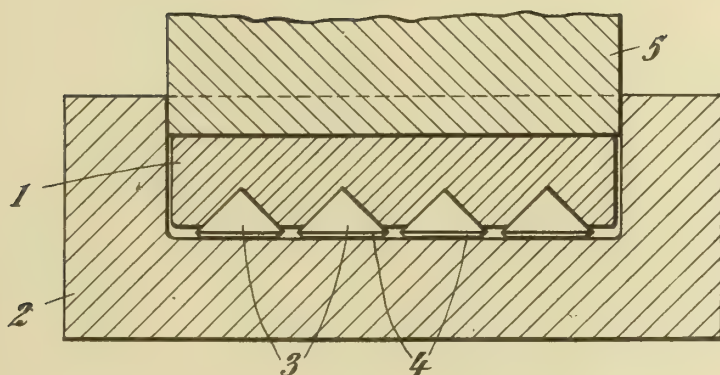
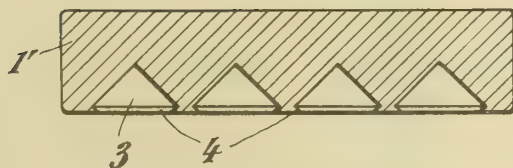


Fig. 2



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ATTORNEY

ALIEN PROPERTY CUSTODIAN

EXTRACTION OF VANADIUM AND PHOSPHORUS FROM RESIDUES OF THE PREPARATION OF ALUMINA ACCORDING TO THE ALKALINE METHOD

Franco Sciacca, Milan, Italy; vested in the Alien Property Custodian

No Drawing. Application filed March 6, 1940

It is known that the alkaline method used in the manufacture of alumina consists of treating bauxite or other aluminous ore with soda. In these conditions aluminium passes into solution in the form of sodium aluminate; but at the same time small amounts of phosphoric anhydride and of vanadium oxide contained in the ore pass into solution in the form of sodium phosphate respectively vanadate; these compounds remain in the mother-liquors during the hydrolysis originating the precipitation of alumina and then their greater part deposits, together with the excess of sodium carbonate present during the concentration of the mother-liquor, in the form of salts containing up to 10–12% of V_2O_5 .

Various methods have been proposed relating to the extraction of vanadium oxide from these mixed salts. According to one method, the salts are neutralized by means of sulphuric acid to a pH-value of approximately 3 and V_2O_5 is separated from the solution by hydrolysis; but this requires a large quantity of sulphuric acid and consequently a considerable amount of oxidising agent to hydrolyse the strongly acid solution. According to another method, the saturated solutions are treated with ammonium chloride in order to precipitate vanadium in form of ammonium vanadate; but this case shows the disadvantage of requiring a large amount of ammonium chloride, quite disproportionate to the small share of V_2O_5 contained in the mixed salts solution, which is very diluted in view of the little solubility of the salts.

I have now found that it is possible, by treating the mixed salts solutions with a limited quantity of acid until the pH-value is very slightly alkaline, to separate by cooling most part of phosphorus as disodium phosphate and a V_2O_5 concentrated mother-liquor is then obtained from which vanadium may be entirely precipitated with ammonium chloride in little excess with respect to the stoichiometric quantity.

On this basis a practical and economic method has been elaborated which does not present the inconvenients of the methods hitherto known.

The mixed crystals, previously washed in order to separate most part of sodium carbonate, are softly dissolved by means of the liquors resulting from preceding washings and in such a rate to obtain a more or less viscous paste; this is gradually heated and an acid is added until a pH-value of about 8 is reached; the limpid solution thus obtained, eventually filtered from the insoluble substances (e. g. alumina), is slowly crystallised until separation of disodium phosphate occurs. The salt is centrifuged, filtered and washed with cold water; while the washing-liquors are used for the dissolving of mixed salts of the subsequent steps, the mother-liquor containing the whole sodium vanadate, is treated with ammonium chloride, while the pH-value is conveniently regulated, or else it is subjected to hydrolysis; in the first case ammonium metavanadate precipitates, from which anhydrous V_2O_5 is obtained by simple roasting; in the second case humid V_2O_5 is directly obtained.

Example.—Mixed salts containing 4% of V_2O_5 and 12% of P_2O_5 are used. These crystals are softly dissolved by means of liquors resulting from preceding washings, in order to obtain a paste containing 60 g/l of V_2O_5 ; this is gradually heated, by adding sulphuric acid, until a pH-value of 8 is reached; the solution is filtered from the impurities, maintaining the temperature above 35° C in order to avoid crystallisation of sodium phosphate; the limpid solution is crystallised by cooling down to 10° C; disodium phosphate is then entirely separated. The mother-liquor containing 50 g/l of V_2O_5 is treated with ammonium chloride, while the pH-value is maintained at 7, since metavanadate is soluble in alkaline or acid solutions, even when diluted.

FRANCO SCIACCA.

ALIEN PROPERTY CUSTODIAN

HIGH-EXPLOSIVE

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Alien Property Custodian

No Drawing. Application filed March 6, 1940

HIGH-EXPLOSIVE.

It is well known that pentrite (tetranitrate of pentaerythrite) as well as T_4 (trimethylenetrinitramine) are explosive substances which, owing to their sensitivity to shock and their high melting point, cannot be easily manipulated and are not suitable for use as high-explosives particularly for military applications.

I have now found that the formic ethers of pentaerythrite, and particularly tetraformiate, may conveniently be mixed in variable ratios from 20 to 80% with pentrite and T_4 and form with them explosives which, although maintaining a good deal of their brisant power, acquire a great insensitivity to shock. These explosives heated to a temperature not above 100° , become sufficiently fluid, in order to permit the stuffing of void projectiles.

Example 1.—A mixture of 60 parts of pentrite (melting point 141° C) and 40 parts of tetrafor-

5 miate of pentaerythrite (melting point $53-54^\circ$), is fluid at approximately $80-85^\circ$ C; it does not explode, even when subjected to the shock of 2 kg from more than 2 m of fall. (Pure pentrite explodes already when subjected to the shock of 2 kg from 30-35 cm of fall).

Example 2.—A mixture of 70 parts of pentrite and 30 parts of tetraformiate of pentaerythrite is fluid at approximately 95° ; it does not explode, even when subjected to the shock of 2 kg from more than 2 m of fall.

10 Equally advantageous is the addition of formic ether of pentaerythrite to mixtures of pentrite or T_4 with other organic explosives having a high melting point; eventually by adding one or more 15 oxidising inorganic salts; and eventually by adding metallic powders suitable of raising the temperature of the decomposition gases.

ASCANIO DUMONTEL.

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OF GREAT BRITAIN AND IRELAND
VOLUME 100 PART 1 2000

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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
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ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF ARTIFICIAL LEATHER, LINOLEUM, COVERING FABRICS, DRIVING BELTS, PACKING RINGS AND SIMILAR STRUCTURES

Emil Hubert, Dessau-Ziebigk, and Hermann Ludewig, Jessnitz, Germany; vested in the Alien Property Custodian

No Drawing. Application filed March 12, 1940

This invention relates to the production of artificial leather, linoleum, covering fabrics, driving belts, packing rings and similar structures.

It has been found that high polymeric resins from polyamide-, polyurea- and polyurethan-forming compounds represent very suitable starting materials for the production of artificial leather, linoleum, covering fabrics, driving belts, packing rings.

Simple polymers, also interpolymers with or without plasticizers and solvents are thoroly kneaded, pressed and calendered in a thermoplastic state for the production of these structures.

It is an object of the present invention to use for the production of the above structures simple polymers consisting of polyamide-, polyurea- and polyurethan-forming compounds.

Another object is to use interpolymers consisting of polyamide-, polyurea- and polyurethan-forming compounds.

These and other objects will appear from the detailed specification following hereinafter.

The resins obtained according to this invention are extremely hard and tenacious and very resistant to water and chemicals. These properties are retained at extremely high as well as at low temperatures and the resins are therefore superior in every respect to all raw materials hitherto employed in the production of artificial leather.

The simple polymers on account of their more hornlike properties need thereby additional plasticizers, whereas the high polymeric mixed condensates consisting of two or several components show per se high flexibility, strength and elasticity which makes them suitable for the production of artificial leather, linoleum, covering fabrics, driving belts, packing rings without additional plasticizers. The polymerization products and interpolymers may be produced from one or several components of the following groups:

1. Amino acids like 6-aminohexane acid, 9-aminononane acid, 11-aminoundecane acid;
2. Lactams of amino acids like ϵ -caprolactam;
3. Dicarboxylic acids+diamines in the form of their salts or of the single components, for instance ethylenediamine-adipic acid, hexamethylenediamine-adipic acid, octamethylenediamine-sebacic acid, $\beta\beta'$ -diaminodithiolsulfide+sebacic acid;
4. Urethancarboxylic acids, for instance urethylan-N-9-pelargonic acid;
5. Diurethan+dicarboxylic acids, for instance octamethylenediurethylan-sebacic acid and adipic acid, tetramethylenediurethan.

Also suitable, especially in connection with the components of groups 1-5 are the following:

6. Diurethans like octamethylene-, tetramethylene-, ethylenediurethylan and -diurethan;
7. Diurethans+diols, for instance components of group 6+glycol or 1,6 hexanediol;
8. Diurethans+diamines, for instance components of group 6+octamethylene-, ethylenediamine;
9. Diurethans+dihalogenhydrocarbons, for instance components of group 6+ethylenebromide, 1,6-dibromohexane;
10. Urethancarboxylic acids+diamines.

The production of artificial leather, linoleum, covering fabrics, driving belts and packing rings is accomplished in a known manner by kneading thoroly the thermoplastic polymerization products, if necessary by additional application of solvents and/or plasticizers and rolling them into skins of suitable thickness. Also filling material and fibers, synthetic and of natural origin, like animal hair, wool, silk, jute, hemp, cotton, asbestos may be added to the polymerization products. The latter may be applied to one or both sides of the fabric, for example solution of the polymers may be used for impregnating fibers which after drying are pressed and calendered. Fibrous material, fabrics, fiber fleeces or fiber felts may be soaked with solutions of the polymers and interpolymers in glacial acetic acid, formic acid or concentrated sulfuric acid. The polymers may be precipitated on the supporting fabrics by liquid solutions which precipitate the polymer, but dissolve the solvent. By pressing and calendering the evenly impregnated filling materials and fibers, there are obtained according to the working conditions substitutes for leather to be used as artificial leather, linoleum, driving belts, etc. By adding plasticizers, wetting agents, pigments as known for leather compositions, the properties of the products may be varied to a very great extent.

By lacquering the surface of the shaped, leatherlike products with solutions of polymers or interpolymers obtained from the polyamide-, polyurea- and polyurethan-forming compounds and by pressing them with calender rollers having a pattern, the substitute materials can be shaped according to the various kinds of natural leather. The new artificial leatherlike products are superior to all known similar products on account of their unusual strength and stability. The special properties of the artificial materials make it impossible that portions of the covering

fabrics crack or tear off. On account of the excellent dyeing qualities of the polymers and interpolymers the obtained products may be well dyed with acid wool dyes, also after the shaping operation.

In order to lower the price for these structures, it is within the scope of this invention to employ additionally other organic compounds hitherto known for the manufacture of artificial leather, like cellulose esters, high polymeric vinyl compounds like polyvinylchloride and polyacrylic acid esters.

Example I

Even parts of caprolactam and the salt of $\beta\beta'$ -diamino-diethylsulfide and adipic acid are heated 16 hours at 180° C. in a steam atmosphere. The high viscous melt is sprayed on a fiber fleece, afterwards kneaded by rollers in a thermoplastic state and rolled out into artificial leather.

Example II

Instead of the interpolyamide of Example I a highly condensed polyamide consisting of 9-aminononane acid and 10 perc. added xylenol is employed.

Example III

A melt of a high polymeric resin obtained by intercondensation 32 hours at 200° C. of ethylene-diamine-adipic acid salt, hexamethylenediamine-sebacic acid salt and $\beta\beta'$ -diamino-diethylsulfide-adipic acid salt (proportion by weight 1:2:2) is thoroly mixed with asbestos fibers and the mixture worked up into flat structures by spraying

and calendering in the usual way. The artificial leather shows great softness and tenacity.

Example IV

5 Even parts hexamethylenediamine-adipic acid salt, ethylene-diamine-sebacic acid salt, caprolactam, 11-aminoundecane acid are mixed and heated 48 hours at 200° C. in a steam atmosphere. The interpolyamide obtained is dissolved in double the amount of formic acid and a fiber fleece or blotting paper is soaked with this solution. The formic acid is quickly evaporated by heating. When this procedure is repeated a starting material is obtained which can be pressed into 15 highly elastic, tenacious, artificial leather.

Example V

10 parts caprolactam and 17,39 parts adipic acid-hexamethylenediammonium salt are first heated two hours at 200° C. in a nitrogen atmosphere and afterwards four hours at 250° C. The condensation product is pressed into water, cut into pieces and heated together with the same amount methanol and about 8% glycerole 12 hours on a steam bath under a reflux condenser. 25 The highly swollen product yields a highly strong, tenacious artificial leather by pressing it between hot plates. Without further treatment or by rolling and stretching in different directions this product is suitable for driving belts, shoe soles, 30 packing rings, covering fabrics, etc.

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ALIEN PROPERTY CUSTODIAN

METHODS FOR SOLVING RAW ALUMINATES OF LIME IN WATER AND EVENTUALLY RECOVERING ALUMINA FROM SUCH SOLUTIONS

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Alien Property Custodian

Application filed March 12, 1940

When raw Aluminates of Lime are dissolved in water to extract Aluminates of Lime as a solution, a limit is rapidly reached over which efficiency falls whilst the solutions oversaturated become instable and difficult to handle.

The inventor has discovered certain new methods by which these difficulties are overcome.

According to these new methods, suitable means are used so as to insure the presence in the dissolving water of alkaline salts such as for instance caustic or carbonated alkalis. Under these conditions, higher extracting efficiencies may be reached and more stable solutions are obtained.

At the same time, certain other salts, which will be described later may be added to the solution in order to prevent silica from getting into solution and means are described to keep within proper limits the proportion of Alkali and salts which might accumulate in the dissolving liquid specially when such liquid is working in closed circuit.

The invention also includes ways and means which may be used in connection with the said solution in order to precipitate more or less completely CO_3Ca in a first operation by the purifying effect of Alkaline carbonate and later on Alumina more or less free from Calcium impurities.

The following description will explain more completely the details of the invention.

It must be clearly understood that the solutions referred to in this patent are always very diluted as opposed to the concentrated solutions usually employed in the usual technics working with Alkaline-Aluminate solutions.

The invention applies to solutions containing generally less than 5 grammes of Alumina and more often less than 1 gr. 5 of Alumina per liter whilst the usual industrial solutions of Alkaline Alumina contain generally over 20 grammes of Alumina and more often 80 to 250 grammes of Alumina per liter.

At the same time, the solutions used according to this invention do not contain more than five grammes Alkali calculated as CO_3Na^2 and contain more generally less than one gramme and further the molecular proportion of Alkali is at a maximum equal and generally inferior to the molecular quantity of Alumina getting into solution. When Aluminates of Lime are solved in water deprived of Alkaline salts, dissolution becomes more and more difficult as the concentration of the solution increases; at the same time, the stability of such oversaturated solution decreases, with the result that a limit is quickly reached when efficiency begins to fall down.

In the presence of Alkali, the soluble Aluminate of Lime is transformed partially (and eventually totally) into very soluble Alkaline Aluminate so

that oversaturation of the Aluminate of Lime is easily avoided and stable solutions are obtained.

Further when stable solutions are used, it is possible to effect the dissolutions at temperatures which are not permissible with less stable or unstable solutions. For instance, dissolution under the conditions described may be carried at temperatures averaging and even exceeding 60°Cent. , and, as Aluminates of Lime are more completely, more easily and more quickly extracted in hot solution, a substantial advantage is secured.

Only small quantities of alkali can be used because experimentation shows that if Silica is to be avoided the alkaline content can only be present as a fraction of the Alumina dissolved in the liquid. For instance, 0,200 to 0,400 only (counted as CO_3Na^2 or the equivalent molecular quantity of CO_3K^2) can be used in a solution containing 1 gr. of Alumina per liter if one does not accept that Silica will also be dissolved in a proportion which would be detrimental in most cases. This proportion of 0,200 to 0,400 of CO_3Na^2 for 1 gr. of Alumina is equivalent to only 0,19 to 0,38 molecule of Alkali for 1 molecule of Alumina in solution. The inventor has discovered that this limit can be substantially raised on condition that the solution contains also other salts which act to stop silica from getting into solution. As an instance salts like Alkali or Earth-Alkali Sulfides, Sulfates and Chlorides separately or in mixture give the desired result.

It must be noted here that owing to equilibrium laws governing solutions containing at the same time Alkali and Earth-Alkali all the salts present will divide into a necessary proportion of Alkali salts and earth-alkali salt of each sort.

As an example, a solution giving excellent results contained per liter:

| | | |
|-----------------------------------------------------------------|-------|----------------|
| Alkali (counted as $\text{Na}_2\text{O} + \text{K}_2\text{O}$) | --- | 0,700 to 0,900 |
| Sulfur combined as sulfides | ----- | 0,150 to 0,180 |
| SO_3 combined as sulfates | ----- | 0,200 to 0,250 |

Generally, under these new conditions with a solving liquid containing not more than 0g,800 to 0gr,900 Alkali carbonate counted as CO_3Na^2 before dissolving the raw aluminate and giving out solutions with about 1 gr. Alumina per liter after dissolution, the quantity of silica solved is practically negligible.

With higher molecular proportion of Alkali to Alumina, it is still possible to have only an acceptable proportion of Silica in the solution whilst the equilibrium solution may contain all its Alumina as Alkaline Aluminate with practically no Alkaline earth aluminate in solution.

In order to get solving liquid containing the elements which have been described, two ways may be employed: the salts may be added to the solving water or these salts or their constituents may be brought in (totally or partially) by the

raw materials to be solved, which may be chosen so that they will contain automatically the desired stuffs.

In order to better understand this point, it must be explained that, under industrial conditions the solving liquid is utilized in a closed circuit organized as follows: the solving liquid is mixed and agitated with the raw material to be solved, exhausted residues are separated, the clean solution is treated (generally by CO² injection) in order to separate Alumina as a precipitate and the solving liquid free from Alumina, and eventually of other precipitated elements (such as CO³Ca) goes back to dissolve again a new quantity of raw material.

If the raw material does not contain the additional salts which must be present in the solving liquid, these must be regularly added in small proportion to make up for the unavoidable losses of the circuit.

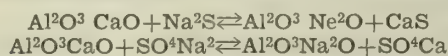
If, on the contrary, the additional salts are automatically brought in by the raw materials it may happen that they will accumulate in the circuit and exceed in the long run the desired proportions, in this case, a proportion of the solving liquid may be regularly taken off and replaced by fresh water in order to keep the solvent solution within the proper limits.

As an example of a raw material containing, at the same time as soluble aluminate of lime the salts necessary for the invention, the following analysis is given:

| | |
|--------------------------------------|-------|
| SiO ² ----- | 21,95 |
| Fe ² O ³ ----- | 5,57 |
| Al ² O ³ ----- | 11,74 |
| CaO----- | 56,97 |
| SO ³ ----- | 0,60 |
| S----- | 1,59 |
| Alkalis as Na ² O----- | 0,15 |
| Alkalis as K ² O----- | 0,55 |

It has been found that the solving liquid may be, in certain cases, automatically kept within the proper limits for certain salts and eventually for all the salts and this is a great simplification.

As regards sulfides and sulfates the regulation is automatic because the sulfide and the sulfate of Calcium cannot exceed a very limited solubility whilst on the other hand the Alkaline sulfides and sulfates have their solubility limited in the presence of Aluminate of Lime, according to the following equations:



The result is that Na²S and SO⁴Na² cannot accumulate over the limit where they are transformed into the calcium equivalent salts and in their turn the Calcium salts are precipitated with the residue as soon as they exceed their limit of solubility and, eventually as sulfo Aluminate of Lime.

As regards the Alkalis, their concentration may also be limited in the case where CO² is used to separate Alumina, as the inventor has found that under proper condition alkalis may be precipitated partially together with the Alumina, probably as a double Carbonate of Alkali and Alumina.

For instance, with an industrial lye containing per liter 0gr,600 of potash and 0gr,100 of Soda (counted as K²O and Na²O) with 1 gr. of Alumina treated by CO² at a temperature of 50 to 60° Cent, the Alkalis are partially precipitated together with the Alumina.

This is a very interesting way to automatically

control alkalis content in the lyes and further when the raw material contain alkalis (as it is often the case) this method has in addition the advantage of recuperating a valuable material.

Alkaline concentration may also be limited by other means. It has been controlled that silica is soluble only when Alkalis exist in the solution as free caustic alkalis or as ionisable salts such as the carbonates. On the contrary, silica is not dissolved by alkali salts when they are practically not ionisable unless relatively high concentrations are reached. This gives the possibility of regulating the alkaline ionisable concentration within the desired limits as it is easy to convert in proper proportion ionisable salts into non ionisable salts by very simple means.

The desired result will be obtained if the alkaline ionisable salts are transformed into chlorine or sulfates and this may be conveniently realized by an addition of the corresponding acids (HCl or SO⁴H²) or more economically by adding earth alkaline chlorine or sulfate which give by double decomposition CO³Ca and the desired alkaline chlorine or sulfate in the part of the circuit where the alkalis necessarily exist in the carbonated state.

When using carbonic acid precipitation, it has been found that the best condition for the solving liquid returning in circuit to dissolve a new quantity of raw-material is reached when the solution is near the point where phenolphthaleine is just discoloured. If the solving liquid is alkaline, efficiency is lower and if it is acid, efficiency falls again.

When the described methods are used, the invention gives solutions which contain alumina dissolved as a mixture of alkaline aluminates and earth alkaly aluminates and at the limit in the state of alkaline aluminate alone.

Precipitation of alumina from the said solution is carried by CO². Now it is well known that precipitation of alkaline aluminates by CO² at temperatures inferior to 75/80° Centigrade even in the presence of seeding alumina gives only gelatinous and more or less colloidal precipitates which are very difficult to filter and to utilize. The inventor has now found that with the diluted solutions which he uses it is possible to obtain, without heating the lyes at the specified temperature (75 to 80°), precipitates of very good quality easy to filter and to handle.

These precipitates of good quality are obtained when precipitation is carried over and over again in the presence of the precipitates formed in successive operations continuously agitated and kept or sent back, continuously, in the reaction vessel until suitable quality is reached. Under these conditions, it has been found that the final precipitate becomes more and more dense and easy to filter and to handle.

As an example, one will describe batch operation. A first batch of solution is treated by CO² and after decantation the clear mother-lye is separated whilst the whole precipitate remains in the carbonating tank. A new supply of solution is admitted in the tank and treated by CO² whilst the first precipitate is agitated in the new solution. Decantation follows and separation of the mother-lye: the whole precipitate (from the two operations) remaining in the tank. This succession of operation is continued until suitable quality is obtained.

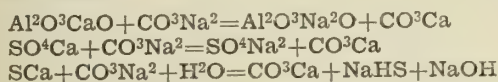
Of course, instead of batch operations, a continuous circuit may be utilized for instance by combining a carbonating vessel and a decanting

tank. In this case, the precipitate from the decanting tank is continuously pumped back into the carbonating vessel until proper grade of precipitate is obtained after which the precipitate may be utilized or the circuit regulated so that a fraction of the precipitate goes back to carbonation as a seed whilst another fraction is taken off and utilized.

Generally, the solutions obtained according to the invention contain a proportion of lime which is precipitated together with the alumina under CO_2 action as only in very exceptional cases the circuits may be organized so as to contain all the alumina as alkaline aluminate. (For instance, when raw materials very poor in silica are used or when a certain proportion of silica will not be detrimental or when solutions are obtained in a very diluted state e. g. less than half a gramme of alumina per liter.)

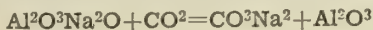
The inventor has however found that it is possible and advantageous to obtain directly a precipitate of alumina containing practically no lime or only a small proportion of lime. This result will be obtained by adding to the solutions (obtained from the raw material according to the invention) before precipitating the alumina by CO_2 a proper proportion of alkaline carbonates (with or without bicarbonates).

Under these conditions all the calcium salts present into the solution will be transformed into CO_3Ca and replaced by soluble alkaline salts as follow:



The solution so treated and separated by known means from solid CO_3Ca is then treated by CO_2 and the Alumina recovered contains practically no Calcium salt.

The addition of Alkaline Carbonate into the solution may be realized simply by taking back a proper fraction of the mother-lye from the precipitation of Al_2O_3 by CO_2 in a partially closed circuit. This is possible because when the carbonating operation treats a lye previously deprived of CO_3Ca according to the proposed method, the mother-lye from carbonation contains Alkaline Carbonate according to the equation



This alkaline Carbonate can therefore be used as a free source of reactive for the proposed operation.

Practically it will be better to send back an excess of mother-lye to avoid exact regulation and it is preferred to avoid an excess of alkaline bicarbonate which can be easily realized by proper regulation of the carbonation operation or by suitable corrections.

Figs. 1, 2 and 3 give schematic examples of certain methods of working out the invention.

Fig. 1 illustrates the case where the raw Aluminate does not bring in the necessary additional salts and more specially does not contain Alkaline salts or does not contain enough alkaline salts.

A is the dissolving tank.

B consists with filters or decanters or both.

C is the precipitating device for CO_3Ca by Alkaline Carbonate coming back from D.

The pipes are numbered 1 to 12.

The precipitating device C will generally comprise a mixing vessel and a decanting tank to separate the precipitate with eventually a finishing filter.

D shows the carbonating device where Al_2O_3 is precipitated. This carbonating device will generally comprise a carbonating vessel where the reaction takes place and a decanting tank to separate the Alumina with eventually a finishing filter. The raw Aluminate goes through 1 into A whilst the supplementary salts are introduced at 2. As the circuit is closed, after the first quantity necessary to get the desired proportion in the circuit salts are only injected to make up the losses.

The solution from A goes off by 3 and 5 through B to C. The residual muds are sent off by 4.

The clear solution is received in C through 5 and is mixed there with the epurating mother-lye coming back from D through 10.

The lime carbonate is evacuated by 7. The purified solution goes into D by 6.

D receives CO_2 necessary for the carbonation through 8. Alumina is extracted through 9 and the mother-lye goes back partly through 10 to C as a purifier and partly through 11 to A to act again as a solving liquid.

Make-up water is admitted at 12.

Fig. 2 illustrates the case where the raw Aluminate contains the desired Alkaline salts so that the circuit would get progressively more and more rich in Alkalis and where regulation is realized by precipitating the Alkalis as explained by regulating the carbonating operation so as to precipitate the excess of Alkalis probably as double carbonate of Alumina and Alkalis. The references are the same as fig. 1 except that E is a boiler where the complex precipitates of Alumina and alkalis are decomposed by heat action into insoluble Alumina and soluble Alkaline Carbonate.

This boiler receives through 9 the precipitate and delivers the Alumina through 13 and the dissolved Alkaline Carbonate through 14.

The rest of the circuit does not differ from Fig. 1.

Fig. III illustrates the case where the precipitation of CO_3Ca in C instead of being obtained through sending back the diluted mother-lye as in fig. 1 and 2 is realized by sending back through 15 a proper proportion of the more concentrated Alkaline Carbonate recovered in E.

Of course, these three examples are not given as a limitation to equivalent ways of realizing the invention. For instance, The regulation of the proportion of ionisable alkalis may be realised by a proper addition, in the mother-like going back to dissolution, of the salts or acids which have been described or by replacing a given proportion of mother-lye taken away by fresh water.

It will be evidently understood that precipitates obtained from the different steps, such as CO_3Ca , mixtures of CO_3Ca and Alumina or mixtures of Carbonates of Alumina and Alkalis in different grades may be used to any industrial purpose for which they are suitable, without getting out of the scope of the invention although this is more specially intended to be used for the manufacture of Alumina.

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METHOD FOR SOLVING RAW ALUMINATES OF LIME
IN WATER AND EVENTUALLY RECOVERING
ALUMINA FROM SUCH SOLUTIONS
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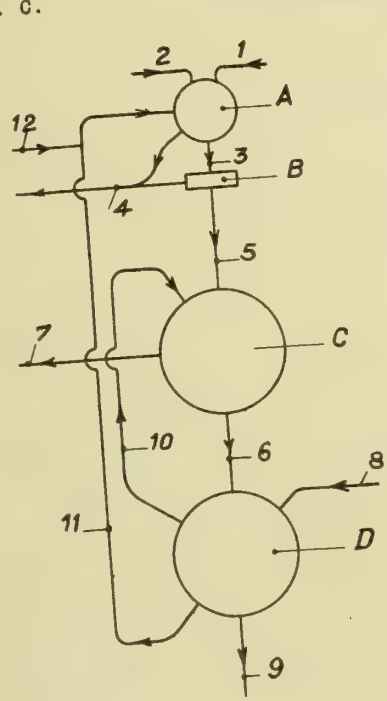


FIG. 1

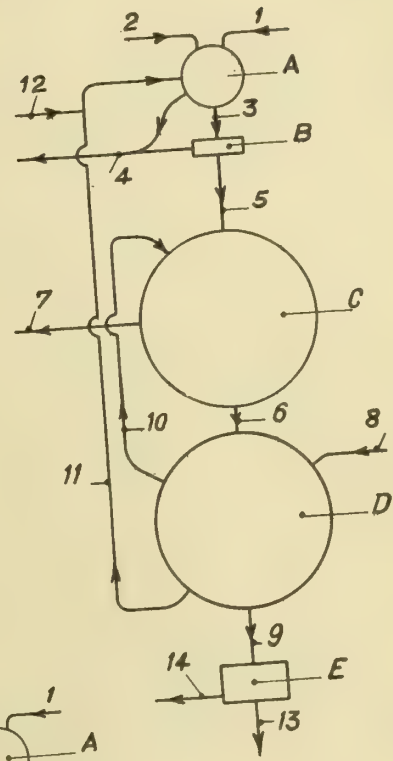


FIG. 2

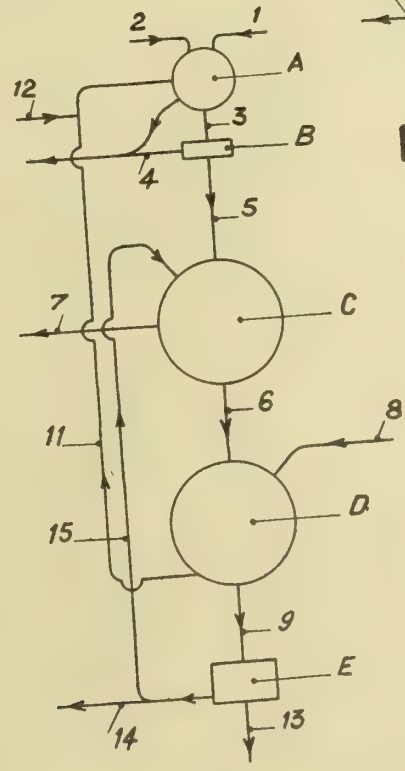


FIG. 3



ALIEN PROPERTY CUSTODIAN

PLANT FOR THE PREPARATION OF HYDROGEN UNDER PRESSURE

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Application filed March 12, 1940

This invention relates to an improved plant for the preparation of hydrogen which is to be used for instance for inflating balloons or like uses, said plant giving however the possibility of storing the gas under very high pressure, said production of gas being continuous or intermittent.

It has already been proposed by the same Inventor to discontinuously produce hydrogen by causing a mixture of ferro-silicon in the state of a powder to be acted upon by an aqueous solution of caustic soda, the reaction taking place in a strong receptacle. In such an arrangement when large quantities of hydrogen are to be obtained, it is thus necessary to use a receptacle of a very great volume according to the quantity of gas to be obtained. Owing to the fact that the process of preparation of hydrogen has a technical value only when the gas obtained is produced under a very high pressure, for instance 200 atm. per square centimeter, it is thus necessary to use very large receptacles which consequently are very heavy and difficultly transportable.

The hydrogen generating plant having to be used in the point of use, that is in the place where for instance balloons are to be inflated, the plant is to be generally speaking, located on a vehicle in order to render its transportation easier. It results that the weight of the generator has a very great importance, said weight having to be as small as possible. Said generator is established under the shape of a hollow cylinder the thickness of which increases more quickly than its diameter so that when it is desired to increase the capacity of same, it is usual to build longer cylinders with a small diameter. Even when operating as hereabove indicated, the generators are very heavy, amounting to 1200-1500 kgs. for a generator of about 500 liters.

It has been proposed to cause said generators to swivel on their transporting carriage and to provide said generators with trunnions so that said generators may occupy a horizontal position during their transportation, and a vertical position when in operation for the production of hydrogen. With said devices it is however necessary to dig deep graves under the generator in order to accommodate the generator in a vertical position when in operation. It was consequently impossible heretofore to realize a portable apparatus or plant capable of producing large quantities of hydrogen and more especially capable of a continuous production, a problem the solution of which is a very important one for the inflation of balloons in the open country.

The plant according to this invention com-

prises in combination a convenient number of tubular generators of hydrogen in which the reaction of the convenient substances or products is to be effected, said generators being preferably fed by a common source of lye of soda and conveniently connected with a common collector for the reception of the gas generated and comprising besides a piping which allows same to be into communication with each other at the desired time of operation with a view to use the heat reaction of one or several generators producing hydrogen for preparing and starting the reaction of one or several other generators thus securing by a convenient working of the several generators the production of hydrogen at a desired pressure and in a continuous or discontinuous manner without having to bring external heat and with a highly reduced consummation of substances such as caustic soda which are used for the preparation of hydrogen.

According to this invention a wheeled carriage constituting an easily plant receives one, two, or a greater number of generators, preferably tubular in shape and having a small length, said generators being provided with a conveniently tight closure and receiving a charge of ferrosilicon which being attacked by water in presence of caustic soda produces hydrogen at the very high pressure desired.

The accompanying drawings which show as a preferred embodiment of this invention a constructional form of the plant comprising two generators of hydrogen:

Figs. 1, 2 and 3 respectively show an elevation, a side view and a plan view of a simple form of a plant located on a transporting carriage,

Fig. 4 is an explaining diagram, a single generator being shown in the figure in order not to complicate the drawing,

Fig. 5 is a diagram showing the relative arrangement of both generators for what concerns the piping for cooling and heating same,

Figs. 6 and 7 are detail views of the tight closing device for the generator.

The plant located on a frame 1 provided with wheels 2 for its easy transportation and thus allowing the production of hydrogen in the very place where same is to be utilized is provided in this embodiment with two generators 3, 4; each of them (Figs. 1 and 4) comprises a tubular resistant receptacle 5, closed at its lower end, and the upper end of which is provided with an obturator 6 constituted by a screw threaded member 7 (Fig. 6) having a movable head 8 which is provided with india-rubber washers 9 (Fig. 4) and a pad 10

which is directly submitted to the pressure which reigns in the tubular receptacle 5.

Said pad is provided with a water jacket 11 having an inlet pipe 12 and an outlet pipe 13. The obturator together with its movable head is provided with a central conduit 14 obturated at its upper end by means of a plug 15 (Fig. 7) which is also provided with the movable head and has a locking bar 16 which engages notches 17 (Fig. 6) provided at the upper end of said conduit 14, thus securing a perfectly tight obturation of said conduit.

The tubular receptacle 5 is provided with a removable internal basket 18 which is to receive the ferro-silicon used for the production of hydrogen. The basket 18 together with the generator 5 is cooled by means of a tubular coil 19 in which circulating water is fed by means of a pipe 20 provided with a cock 21 connected with a pump 22. Said coil is provided with an outlet 23 (Figs. 4 and 5).

As shown in the diagram of Fig. 5, the outlet 23a of coil 19a of generator 3 may be brought into communication through the three-ways cock 23 either with the open air by a tubulure 25 or with a conduit 26 connected through the three-ways cock 27 with the conduit 20b feeding the coil 19b of generator 4. Similarly the outlet 23b of coil 19b of generator 4 may be brought into communication by means of a cock 28 with an outlet 29 or with a conduit 30 communicating by means of a cock 31 with a conduit 29a which feeds the coil 19a of generator 3.

The pipe 12 of the water jacket is connected with the delivery side 32 of a pump 33 which besides feeds through a pipe 34 a tank 35 constituting a water jacket for the head of the tubular receptacle 5 constituting each of the generators 3, 4.

In the tubular receptacles 5 ends the delivery pipe 36 (Fig. 4) of a pump 37, said pipe 36 comprising a valve 38 together with a draining cock 39. The pump 37 is connected through its suction side 40 with a tank 41 containing caustic soda and provided with a false bottom 42 with a cock 43 for the preparation of the solution of caustic soda. The water which is necessary for the preparation of said solution is fed to the tank 41 by the delivery pipe 44 of a pump 45.

The receptacle 5 which constitutes each of the generators 3, 4, is provided at its upper part with an overflow outlet 46 which receives a pipe 47 provided with a non-return valve 48 and arriving at the upper end of a draining tank 49 provided at the lower end with an emptying pipe 50 provided with a cock. A pipe 51 for the collection of hydrogen is connected with the upper part of the tank 49 and connected with a cooling coil 52 located in a tank 53 to which cooling water is brought by a pipe 54 fed by pump 45.

The tubular coil 52 is connected by a pipe 55 with a separating tank 56 provided with a draining pipe 57. A pipe 58 connects said separating tank 56 with an epurating tank 59 provided with an obturator similar with the one of the generator. Said epurating tank 59 is connected by a pipe 60 with a filling collector 61 for tanks or other receptacles 62 and having any desired arrangement.

The operation is as follows:

The obturator 6 of each of generators 3, 4 having been opened, one of said generators, for instance generator 4, receives the desired charge of ferro-silicon broken into fragments of convenient size, said charge being carried by an

intermediate perforated bottom 63 (Fig. 4) of the basket 18. The obturator of said generator is afterwards secured in its position.

The lower part of basket 18 of generator 3 receives a mixture of powdered ferro-silicon and caustic soda (for instance caustic soda of the trade in flakes) which charge is covered by fragments of silicon. The obturating cover of said generator 3 is then put into its closing position and the quantity of water necessary for the starting of reaction is poured into the generator through the central conduit 14, the obturator 15 (Figs. 4 and 7) being afterwards put into its closing position. The reaction starts after a very short time thus producing a very important heating while hydrogen is generated inside the receptacle. Once the reaction started, the cock 38 of the delivery side of pump 37 for the caustic soda is opened, said pump having been put into operation for forcing said caustic soda into the generator 3.

The pump 22 which forces cold water into the tubular coil 19 keeps a convenient temperature inside receptacle 5 as well as in basket 18, the steam which is formed in the coil 19 during said cooling being wasted into the open air through the three-ways cock 24 which connects the pipe 23a of the outlet of coil 19a (Fig. 5) with the tubulure 25.

The generated hydrogen arrives, eventually together with the liquid contained inside the tank 5, through pipe 47 into the draining tank 49, the liquid carried with the hydrogen collecting into the lower part of said tank, while the hydrogen is cooled in the tubular coil 52 before entering the separator 56. The steam carried with by hydrogen and which is condensed inside the coil 52 collects in the lower part of separator 56 and the hydrogen is afterwards delivered into collector 61 for feeding tubes 62 after having passed the chemical epurating tank 59.

After a while when the ferro-silicon contained in the generator 3 is almost exhausted—which is easily determined by the duration of operation—the cock 24 is closed, the discharging pipe 23a of the coil 19a is connected with pipe 20b by cock 27 which thus sends into tubular coil 19b of generator 4 the steam formed in the tubular coil 19a. The cock 28 is brought into a convenient position for causing the pipe 23b of discharge of coil 19b to communicate with the outlet 29, the operation being conveniently managed so that when the ferro-silicon contained in the generator 3 is completely exhausted the temperature of the generator 4 has attained a convenient value for securing the starting of the reaction and the immediate production of hydrogen in said generator when same is fed with a solution of caustic soda.

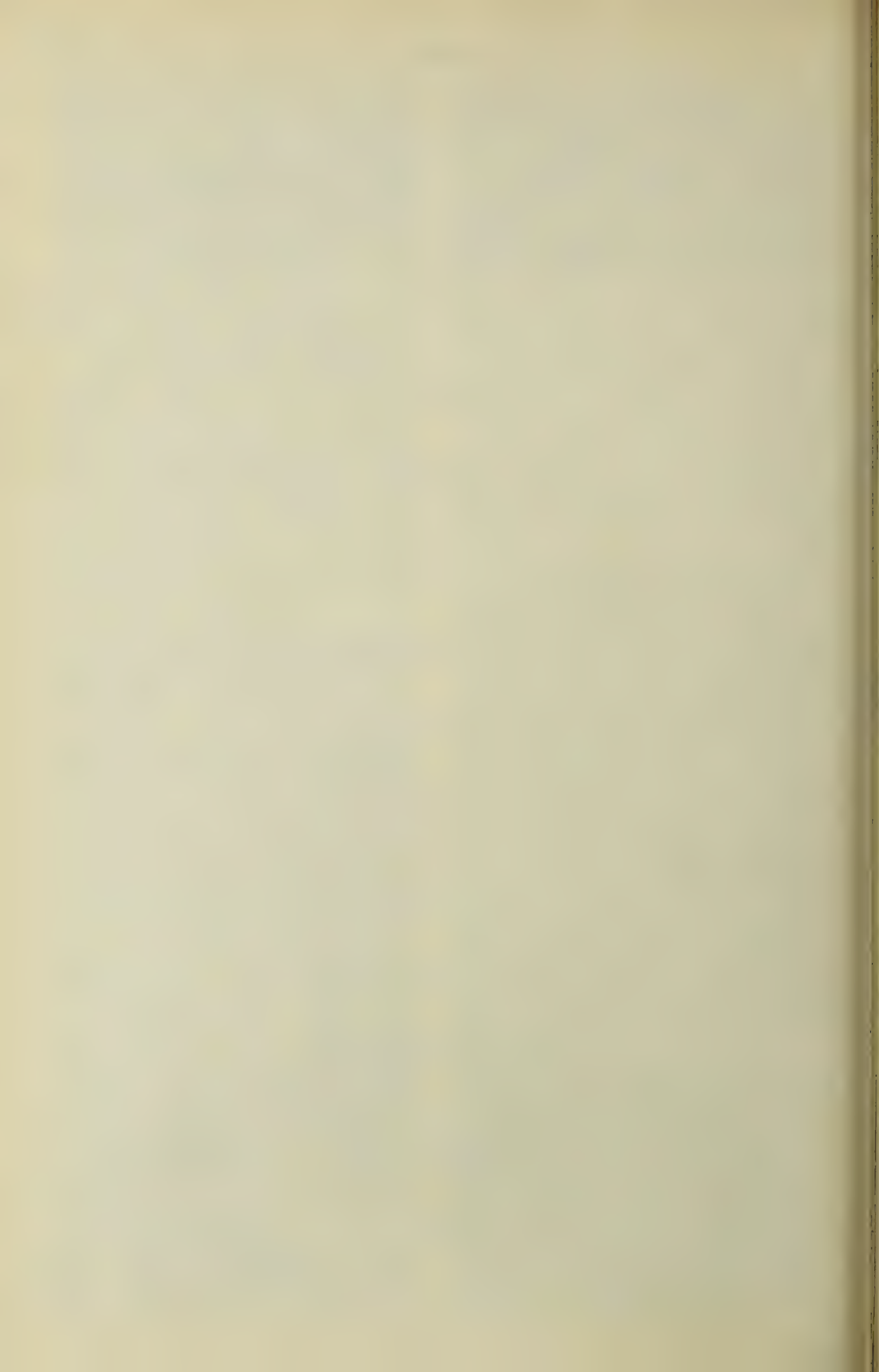
The production of hydrogen is then going on with generator 4, the generator 3 being turned off for allowing same to be anew charged with ferro-silicon. Said charge is operated by using the crane 63 (Fig. 1). When the ferro-silicon of generator 4 is exhausted, the generator 3 is anew brought in operation, the manoeuvre described here-above being effected for generator 3, and the described operation is going on without any interruption in a practically continuous manner, the generator being alternately recharged with ferro-silicon as required, the solution of caustic soda which is necessary for the production of hydrogen being prepared according to the want in the tank 41 without interrupting the operation of the whole apparatus.

The draining tank 49 is preferably carried by means of springs 64 (Fig. 4), a convenient sounding or other alarm device being located on said tank in order to let the operator know when the quantity of liquid collected in the lower part of said tank attains a conveniently predetermined value, necessitating the emptying of same. A gauge-glass could also be provided on said tank for letting know the operator when a draining has to be operated in said tank 49. Indicating apparatus could also be provided on the separator 56 as well as on epurator 59.

The several pumps may be provided with corresponding motors for the operation of same, or they could be also controlled by a common motor if desired.

5 The invention applies for the production of gaseous hydrogen for any use and more particularly for the production of hydrogen designed for filling up store tubes designed for inflating balloons or even for the direct inflating of said balloons on the very spot where said inflating has
10 to take place.

GEORGES FRANÇOIS JAUBERT.

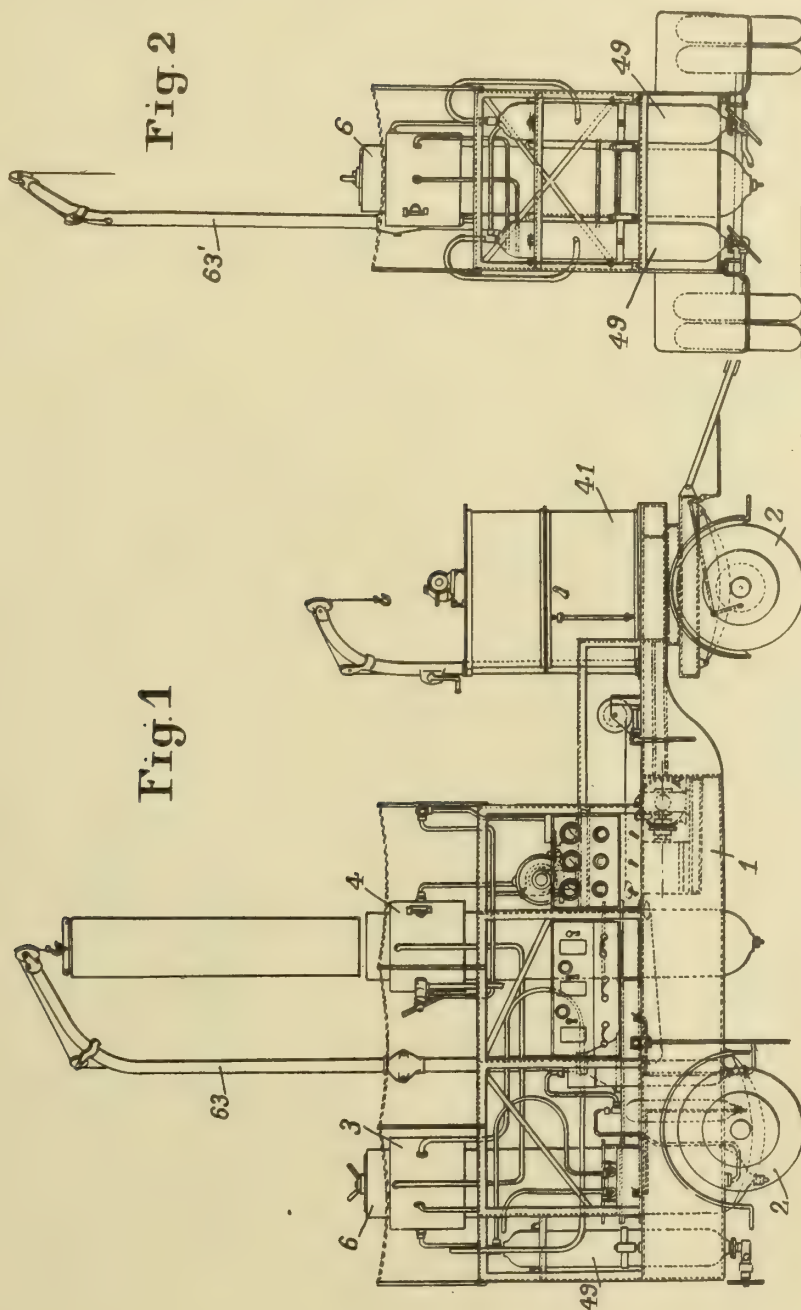


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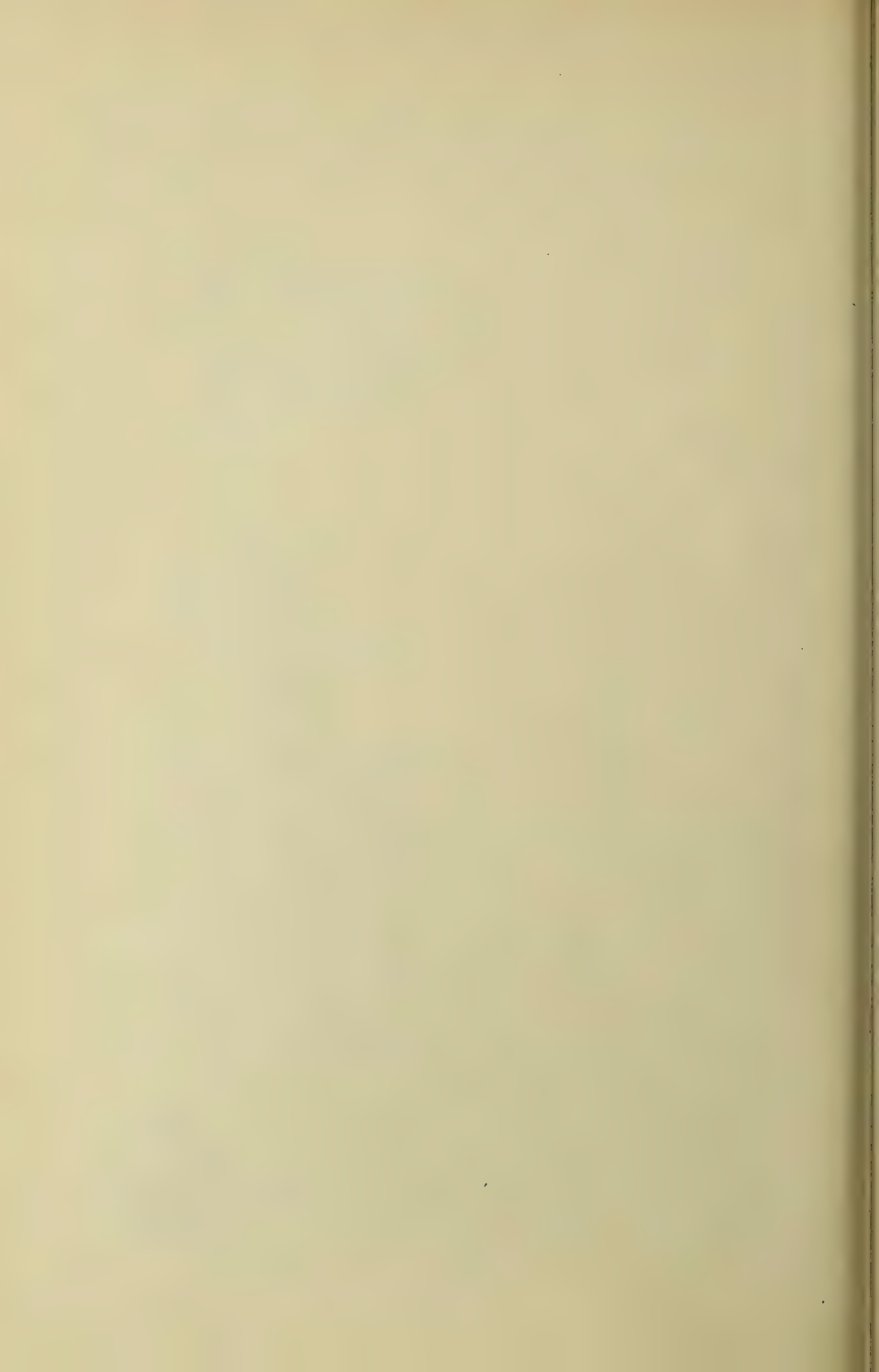
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3 Sheets-Sheet 1



Inventor,
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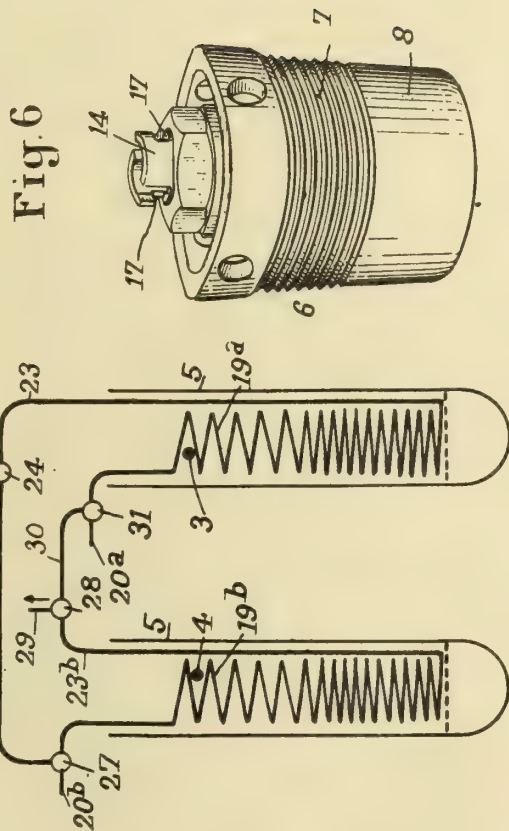
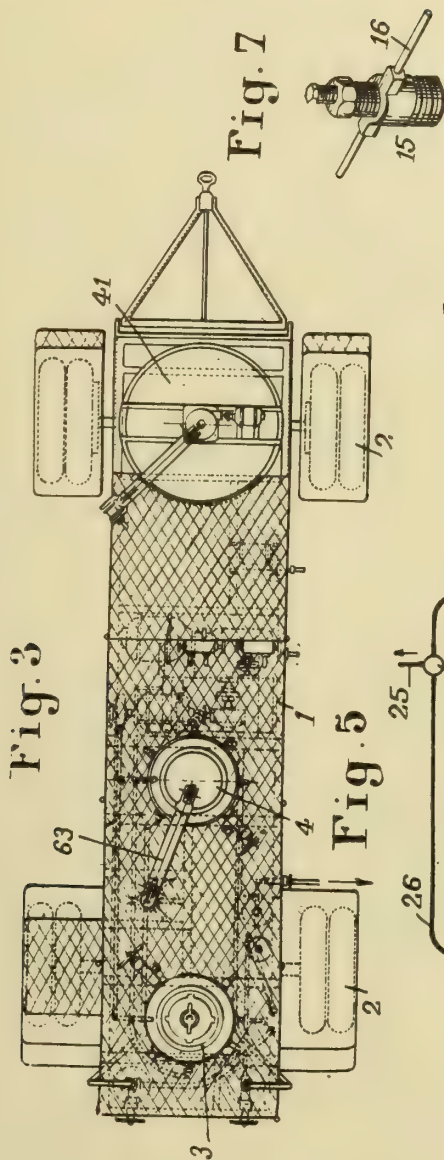
By: Glascock Downing & Lebold
Attys.



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Inventor,
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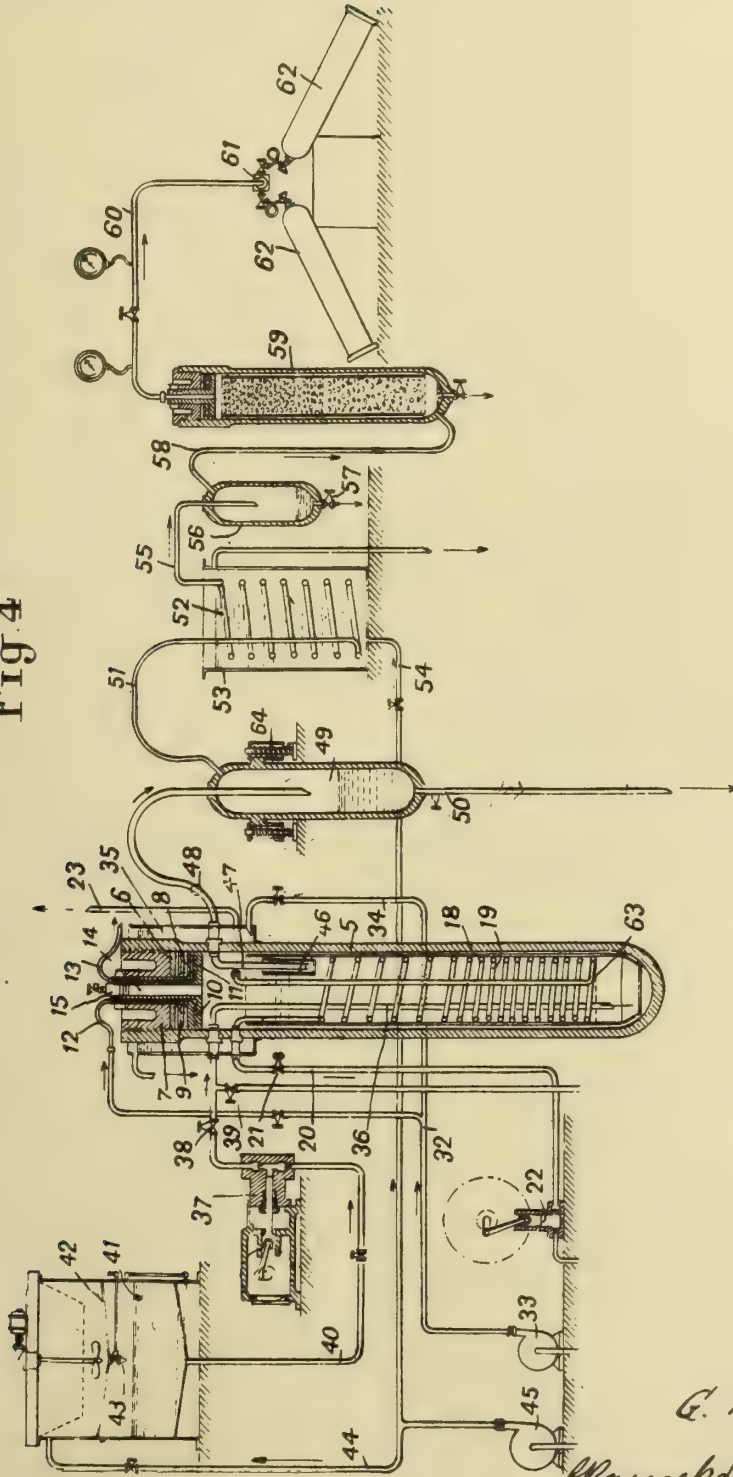
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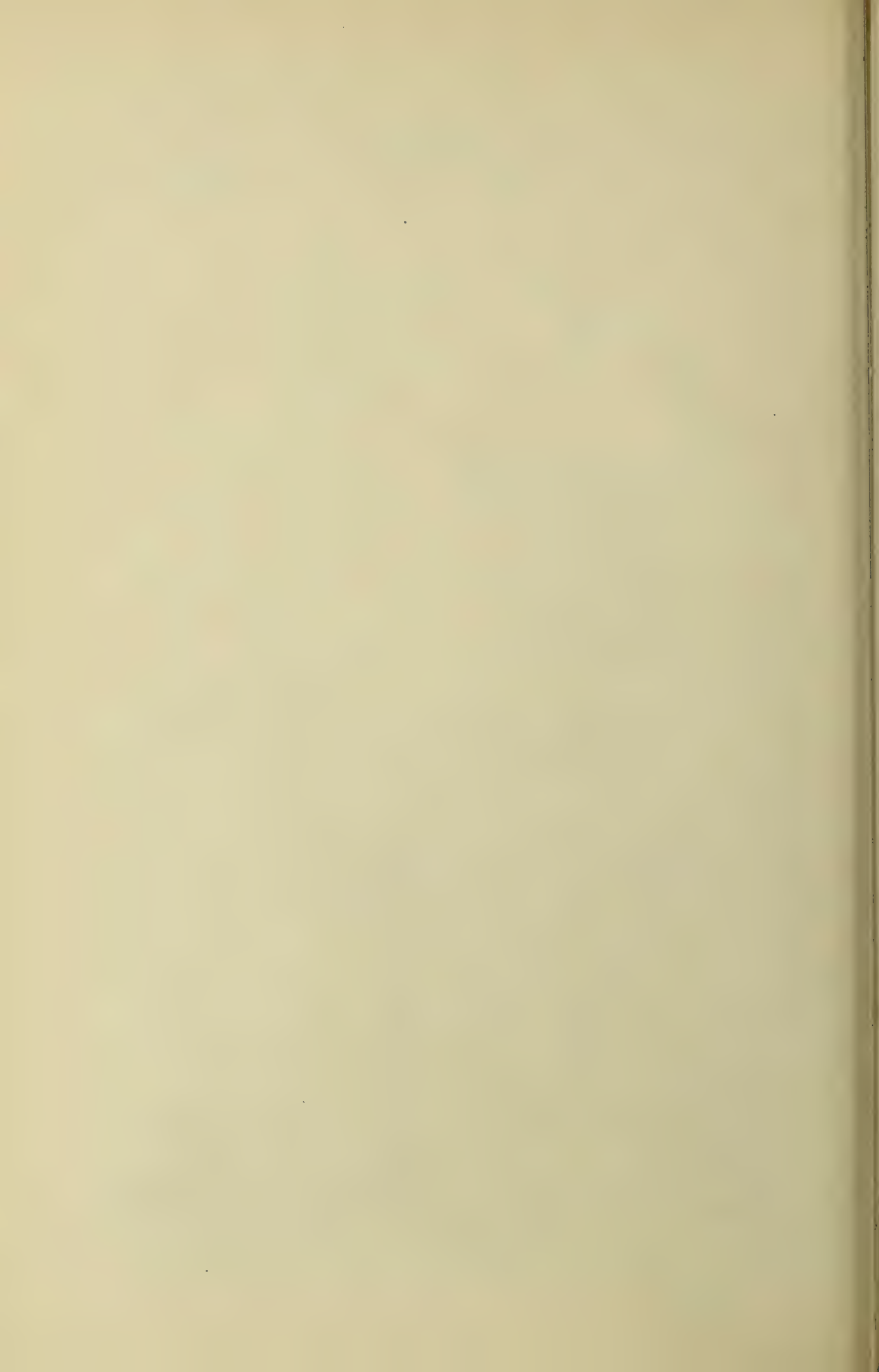
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Fig. 4



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ALIEN PROPERTY CUSTODIAN

APPARATUS FOR STORING AND CONVEYING OF INDEX CARDS OR OTHER SUITABLE ARTICLES IN CONTAINERS, OR THE LIKE

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vested in the Alien Property Custodian

Application filed March 13, 1940

The invention relates to an apparatus for storing and conveying index cards and other suitable articles in upright containers, or the like by which by means of a combined arrangement of conveying mechanisms, electric switching means and selecting and adjusting devices every individual container can be selectively automatically lifted from its place in upright position into a field of operation and subsequently returned automatically and lowered on to the same place of rest.

Apparatus are already known, in which in a box upright containers are arranged the one behind the other to be lifted singly by a releasing device by such a distance, that they can be gripped by hand to be removed from the container.

The problem solved by the present invention far exceeds this problem. The selecting of an index card has not to be effected visually and the container has not to be removed from the container arrangement by bodily force. The container arrangement and the working table of the operator have to form a common utensil.

The work of the person working on the index cards must not be permanently interrupted by the necessity to fetch fresh containers. In the interest of increasing the efficiency even the slightest intellectual diversion from the proper work by mechanical searching has to be limited to a minimum.

The automatic selecting of the desired container, corresponding to an adjustment of the sign on the container and on the index card in an adjusting device is necessary and also an automatic conveying of the container from the pile to the working field which automatically follows on the adjusting. To make the time of conveying as short as possible the shortest conveying path is the most suitable.

The arrangement must however be such that the greatest number of containers and index cards can be accommodated on the smallest space underneath the working field, for instance in a desk, and nevertheless all containers must be conveyed through only one aperture of the table into the working field. The apparatus further must permit of using the index cards with the containers in flat or upright position.

All these problems are solved by the invention which will be hereinafter described. The description relates merely to forms of construction and to some further examples of details of the total device.

The apparatus according to the invention is illustrated by way of example in the accompanying drawings, in which

Fig. 1 is a longitudinal section through a desk like apparatus with upright containers for index cards one arranged behind the other,

Fig. 2 a cross-section of Fig. 1 and shows the

front side of a vertical container raised from the desk,

Fig. 3 is a top plan view of Fig. 1, the desk plate being removed,

Fig. 4 shows in longitudinal section a corner of the desk and one container in lifted position and, in dash lines, in oblique position on the pulled forward container plate,

Fig. 5 shows on larger scale the lamellae arrangement of the Venetian blind,

Fig. 6 is a similar view as Fig. 5, the lamellae being pushed aside at a point through which a container has to pass,

Fig. 7 is a cross-section through the desk plate with the lamellas of the Venetian blind and the lateral guides of the same,

Fig. 8 is a top plan view of Fig. 7, the table plate being removed,

Fig. 9 is a longitudinal section on line *a/b* of Fig. 10 and shows a table with several piles of containers,

Fig. 10 is a top plan view of Fig. 9, the desk plate being removed,

Fig. 11 shows in section on line *c/d* of Fig. 10 the bottom portion of the desk and the lifting device,

Fig. 12 is a part top plan view of Fig. 10 on larger scale,

Fig. 13 is a longitudinal section on line *e/f* of Fig. 10 and shows the lifting device in conjunction with the adjusting device, the lifting device being of different type as shown in Figs. 9 to 12,

Fig. 14 is a top plan view on section line *g/h* of Fig. 13 and shows particularly the lifting device,

Fig. 15 is a vertical longitudinal section through a portion of a container arrangement and shows a selecting- and adjusting device, in which a cross spindle is provided for shifting the selecting lever and a corresponding contact arrangement,

Fig. 16 is a cross-section through Fig. 15, the table plate being removed,

Fig. 17 shows on larger scale a portion of the cross spindle in longitudinal section with the selecting lever and the contact arrangement,

Fig. 18 shows in elevation partly in section the device shown in Fig. 17 and on a larger scale as in Fig. 16,

Fig. 19 is a part sectional view on line *g/h* of Fig. 20 and shows the contact springs and contact lamellas for finding the desired container group and the magnet brake connected therewith,

Fig. 20 is a completion of Fig. 14 and shows the group of contact springs and contact lamellas and the coordinated magnet brake not shown in Fig. 14,

Fig. 21 is a connection diagram,

Fig. 22 is a completion of Fig. 4 and shows the pressing-on bars of the container frame in open state,

Fig. 23 is a section on line *i/k* of Fig. 22 and shows the pressing-on bars being in closed state, Fig. 24 is a section on line *l/m* of Fig. 23.

The desk-like apparatus, as shown in Fig. 1, consists of a bottom plate 1, side plates 2 and a top plate 3. This top plate 3 is cut out so that a window 4 is formed. In the desk containers 5 of index cards are arranged the one behind the other, by means of guide bars 6 spaced in longitudinal direction. In each container 5 overlapping pockets 7 for index cards are piled. Each container has a lid 8 at the lower end. Electromagnets 9 are arranged underneath the containers and destined to lift the selected container by means of cranked levers 10 when after depression of a corresponding spring-controlled key *x*, the circuit is closed, so that the selected container is brought into engagement with a conveying device consisting of pressing-on rolls 11 driven by means of a transmission gear 13 from a motor 12. As many keys *x* are provided as there are electromagnets 9, one magnet being provided for each container. The motor 12 is actuated by a contact key *y*. Fig. 1 shows in which manner the aperture or window 4 can be opened or closed by a Venetian blind consisting of lamellas 14. The Venetian blind is rolled up by a spring-drum 15 and can be pulled back by hand for closing the window.

As shown in Fig. 4 the containers 5 may be packed the one tightly behind the other. One of the containers, 5a, is shown pushed out in upward direction so that it can be rearwardly inclined in the direction of the arrow. The container can be folded back by hand or automatically by gravity, or by a stop against which the container strikes so that it must tilt over.

The container is hingedly mounted on a foot 5e by a joint 5d. This foot remains preferably always in the guide bars 6. In Fig. 4 it is further shown that this container consists of a carrying frame 5b and of a plate 5c adapted to be removed from the frame and carrying the pockets 7 for the index cards, said pockets overlapping one another, as shown in Fig. 1. Laterally projecting pins 16 of the plate 5e engage in slots 17 of the carrying frame 5b so that the plate can be pulled out to a certain position. In the slots 17 of guide bars 6 forwardly directed slots 18 are made through which the container plate with the pile of index cards can be removed from the frame. Fig. 4 shows how the container 5a when being lifted pushes aside the lamellas 14 of the Venetian blind at the point through which the container projects, the lamellas having trapezoidal lower ends. This arrangement is shown on larger scale in Figs. 5 and 6. The lamellas 14 are all movably mounted in a frame which admits of shifting the lamellas in forward or rearward direction by the width of a few lamellas in forming a passage for a container width so that its lid 8 can fold down. In order that the lamellas bear always tightly the one against the other, springs 19 and 20 are arranged on each end of the lamella frame and slightly press on the lamellas so that they contact with one another. If a container is lifted, the lamellas are pushed aside at this point in compressing the springs 19 and 20. The frame which encloses the lamellas on the edges consists of elements 21 and 22 hingedly connected by hinge bolts 23. The frame therefore forms so to say a chain and, together with the lamellas 14, it can be rolled upon fixed guide bars 24 by means of a drum 15 (Fig. 1) to open the window 4 in the top plate.

As shown in Figs. 7 and 8 in cross-section and top plan view the lamellas 14 have lateral arms 14a resting on the guide edges 22a of the elements 22. The frame, the side of which consists of the continuous elements 21 and 22, consists at the lower and upper ends of rim bows 25 and 26 which are connected by pivot bolts with the actually last elements 22, 23.

Fig. 9 shows in longitudinal section a turning device, on which several container piles are mounted. The outer sides of the piles of containers form, as shown in Fig. 10, a polygon. Fig. 10 is a top plan view of Fig. 9. This arrangement is practical in order that, when turned about the axle 27, one pile of containers after the other can be brought to below the window 4. The containers 5 are mounted on a turnable plate 28 in the manner described. This plate has apertures 29, as shown in Fig. 10, which allow accession to the containers from below. The plate 28 is enclosed by a ring 30 with a serrated bar 31 with which a motor 32 meshes for rotating the plate and with the same the piles of containers. The ring 30 is guided by balls 33 on a stationary ring 34.

As shown in Fig. 11, the containers 5 have notches 35 in which spring-controlled pawls 36 engage which are held in the inoperative position by the action of springs 37. Underneath the containers blade springs 38 are mounted which are compressed in the inoperative position. Under each of the containers two electromagnets 39 are mounted which, at the actuation of the adjusting device, i.e. when the pile has been adjusted to the desired container, press their iron cores upwards when the circuit is closed, and thereby detach the locking pawls 36.

Abutment bars 40 determine the lowermost position of the containers. These bars 40 are fixed on the carrying plate 28.

The pairs of electromagnets 39 coordinated to every container are shown in Fig. 11 displaced for spatial reasons. These pairs of magnets are only under the window 4 (Fig. 9), that is only under the foremost set of containers.

As shown in Fig. 13, the containers may be actuated not by magnets and contact keys coordinated to each container, but by means of an adjusting device consisting of an endless band 41 on which the signs of the containers are marked. This adjusting device is actuated by a knob 42. If the endless band is moved, the turning movement is transmitted by suitable toothed wheel transmission in downward direction by a band 43 upon a selecting device 44 through the intermediary of a shaft 45. This selecting device 44 consists of an endless band on which three levers 46 are arranged mutually displaced so that, when a lever leaves the last container of a pile of containers, the next following lever is brought into conveying position under the first container. In this manner it is possible, to attain the adjusting to a desired sign actually on the shortest path by turning the knob 42 to the left or to the right. If this adjustment of the adjusting band has taken place, the lever 46 of the selecting device is under the desired container, after the group of containers in which this container is, has been brought, by means of the turning device (Figs. 9 to 12) and by compressing of the contact key *z*, to below the working field. By depressing a contact knob *u* the electromagnet 47 is excited and actuates a lever 48 having a swing lever 49. This swing lever 49 extends in transverse direction under

the whole lower side of the containers and can therefore push upward the lever 46 of the selecting device 44 actually adjusted under this container and thereby lift the container.

Instead of the lever 46 electromagnets may be shiftably arranged directly under the containers in order that they can be brought into engagement with every individual container.

At the same time when the electromagnets 47 are excited, also the motor 12 is energized by the contact key *y* (Fig. 10) so that the pressing-on rolls 11, as soon as the container comes into engagement with them, convey this container into the working field.

Fig. 15 shows another form of construction of a selecting and adjusting device. According to Fig. 15, a spindle 50 with intersecting double screw threads is rotated by the motor 12, and a nut 51 mounted on the spindle and carrying an oscillatable selecting lever 52 is thereby moved up and down. A contact spring 53 is fixed on the bottom of nut 51 and slides between contacts 54 and 55. One contact 54, 55 is coordinated to every container. The current paths from minus pole to plus pole are actually interrupted at two points, as shown in Fig. 21. These points may be closed on the one hand by the contact spring 4 and on the other hand by the adjusting key, not shown in Fig. 15, coordinated to every pair of contact lamellas and consequently to every container. If therefore an adjusting key 56 has been depressed, the circuit is completely closed, as soon as at the upward and downward movement the contact spring 53 of lever 52 has come into register with the container adjusted in the adjusting device. An electromagnet 57 in this circuit is thereby energized, which actuates, by lever and rod connection 58, 59, oscillatable bars 60 by which the levers 52 convey the container in the desired direction and bring it into contact with the press rolls 11.

When several piles of containers are arranged movable, that pile of containers has to be first conveyed to below the window 4, in which the desired container 5 is. With this object in view contact springs 61 are arranged mutually displaced on the lower side of the supporting plate 28, as shown in Fig. 19, for each group of containers, so that each group has such a contact spring 61 at a different distance from the pivot axle 27, as shown in Fig. 20. These contact springs slide below the working field each one between two contact lamellas 62 fixed above the bottom plate 1 and close this interrupting point 62 at this moment. If in the adjusting device the corresponding group key 66 is depressed, the group is selected and the circuit closed on both interrupting points, as shown in Fig. 21. A magnet brake 63 inserted in the circuit cuts out the motor 32 at the moment of the circuit closing and stops instantaneously the movement of the turning device, so that the desired group of containers is below the window 4.

By means of the above described selecting, adjusting and conveying devices only the desired container can be removed from the group and conveyed into the working field.

For working in one of the containers in a pile of pockets with index cards it is not necessary to lift the container up to the hinge of lid 8 above the top plate of the desk. It is preferable, to lift it only so far, as shown in Fig. 1, that all

strips of the pile of containers are above the window so that, after folding down the cover plate 8, even the lowermost index card can be removed.

In this manner the operator can arrange a considerably greater number of index cards piled the one above the other so that they are visible and can be gripped with the hands.

If, however, the cover plate 5c has to serve also as support for writing on an index card, it is advisable to pull out the container so far, as shown in Figs. 4 and 22, that the whole plate with the pile of containers and with the cover plate 8 is above the window 4. This actually desired height to which the container projects from the window can be selectively adjusted by a simple device which is not shown. In this instance it is necessary to mount, besides the end stop at the end of the container, another stop above this end stop and adapted to strike against an adjustable bar, when this bar has been shifted by a handle in the direction of the stop. This bar can then actuate an electric depressible contact and thus cut out the motor 12.

The container plates 5c with the walls 7, overlapping the one the other and separating the index cards, may be placed turned upside down into the carrying frame, so that the separating walls can be opened in downward direction, in which case the cover plate 8 would be hingedly mounted at the top end, as shown in Figs. 13 and 23. It is then advisable to provide on the carrying frame 5b pressing bars 5f shown in Figs. 20 to 24, which overlap the side portions of the walls of the pockets 7 in order to prevent tearing off of the intermediate walls between the index cards when they are conveyed back. These pressing bars can be equipped with springs 5g, Fig. 24, by which the pockets 7 for the index cards are tightly pressed the one against the other. If the plate 5c is pulled out, the pressure bars are oscillated upwards about hinges 5h and it is possible to write on the index cards without hindrance. When springing back into the carrying frame the pressing bars are lowered on to the pile 3c only when this pile of containers has been completely inserted into the carrying frame 5b.

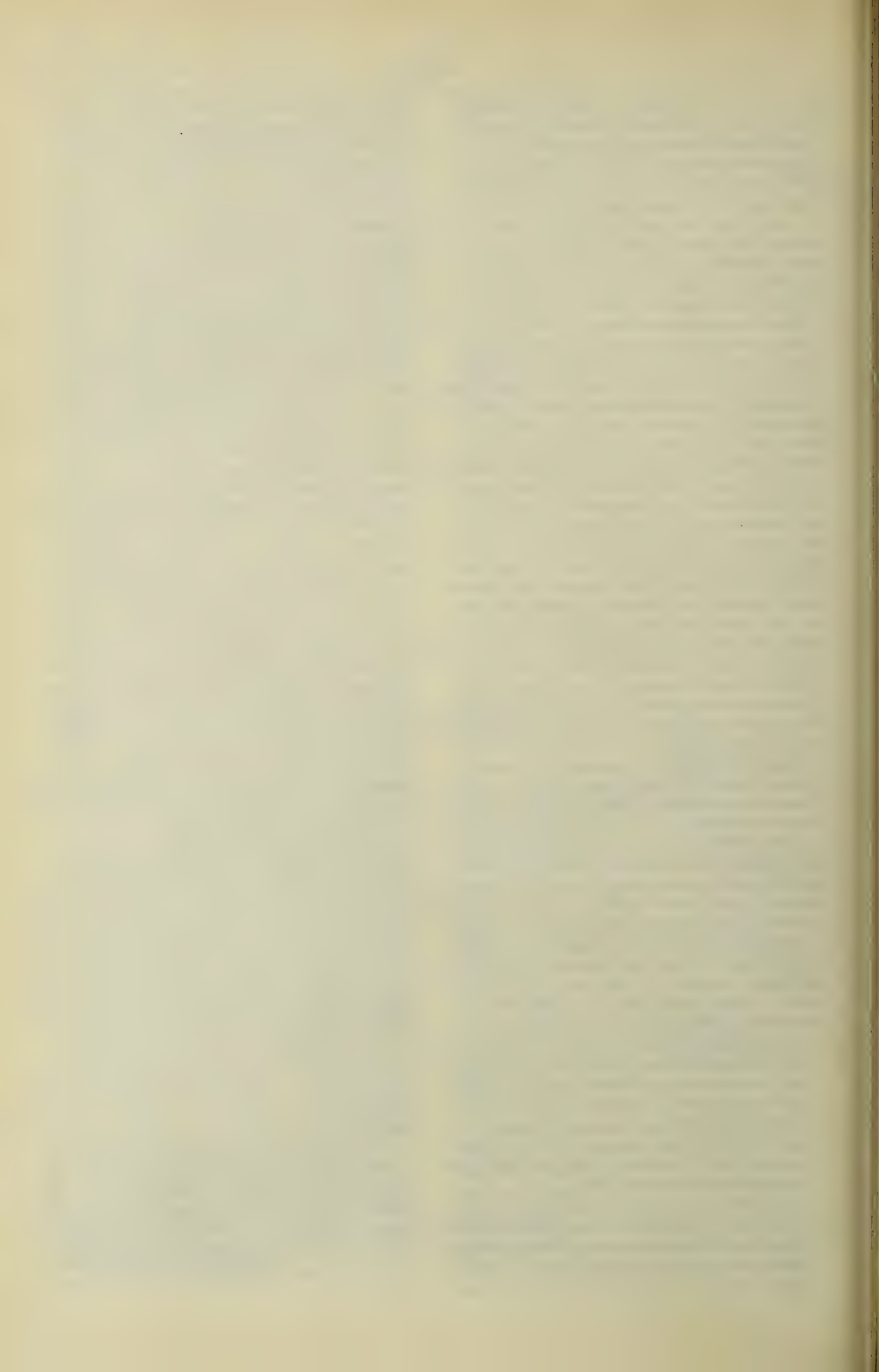
The pressing bars 5f may evidently have pawls and thereby be held in a certain opened or closed position until they are actuated accordingly.

Whereas in the arrangement of the pockets 7 shown in Fig. 23 it is advisable to equip the same with hinges for facilitating the unfolding, it is of advantage in the upright arrangement shown in Figs. 1 and 2 to use card pockets without hinges contrary to the known practical manipulation of index cards, in order to prevent automatic and unintentional folding down of the pockets and thereby dropping out of the index cards.

The containers may be arranged so that the longitudinal sides are at the top and bottom or inclined instead of the short sides, so that in the container piles, when they are conveyed into the working field, the pockets can be turned over like the leaves of a book.

As regards the conveying device it may be mentioned that, instead of pressing-on rolls, for instance rolls with toothed wheels, pinions or the like may be provided or other rotating or reciprocating mechanisms. The conveying can be effected also over the whole length by a single device, for instance by spreadable lazy tongs.

OTTO ALFRED BECKER.



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O. A. BECKER
APPARATUS FOR STORING AND CONVEYING OF
INDEX CARDS OR OTHER SUITABLE ARTICLES
IN CONTAINERS, OR THE LIKE
Filed March 13, 1940

Serial No.
323,734

9 Sheets-Sheet 1

Fig. 1

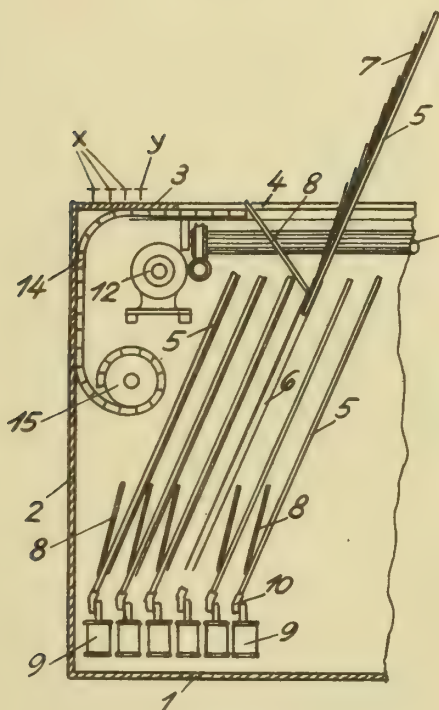


Fig. 2

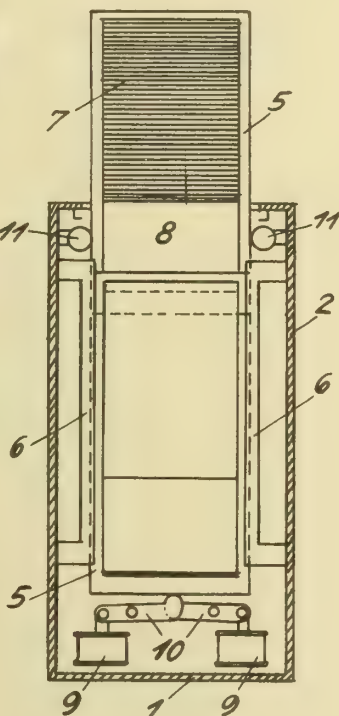
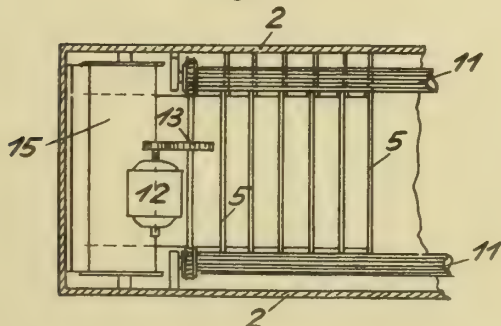


Fig. 3



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Fig. 4

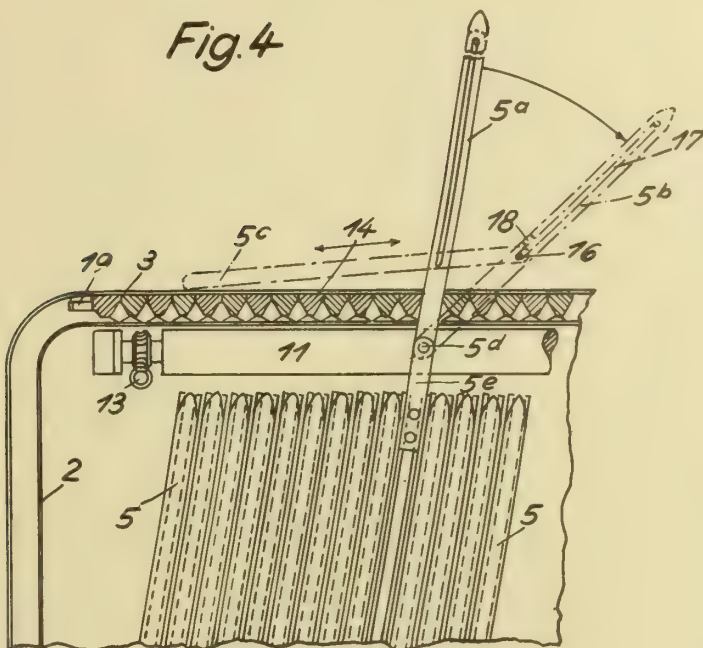


Fig. 5

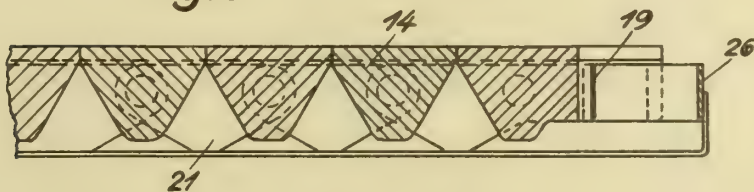
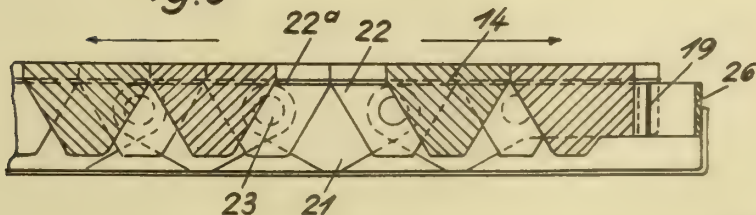


Fig. 6



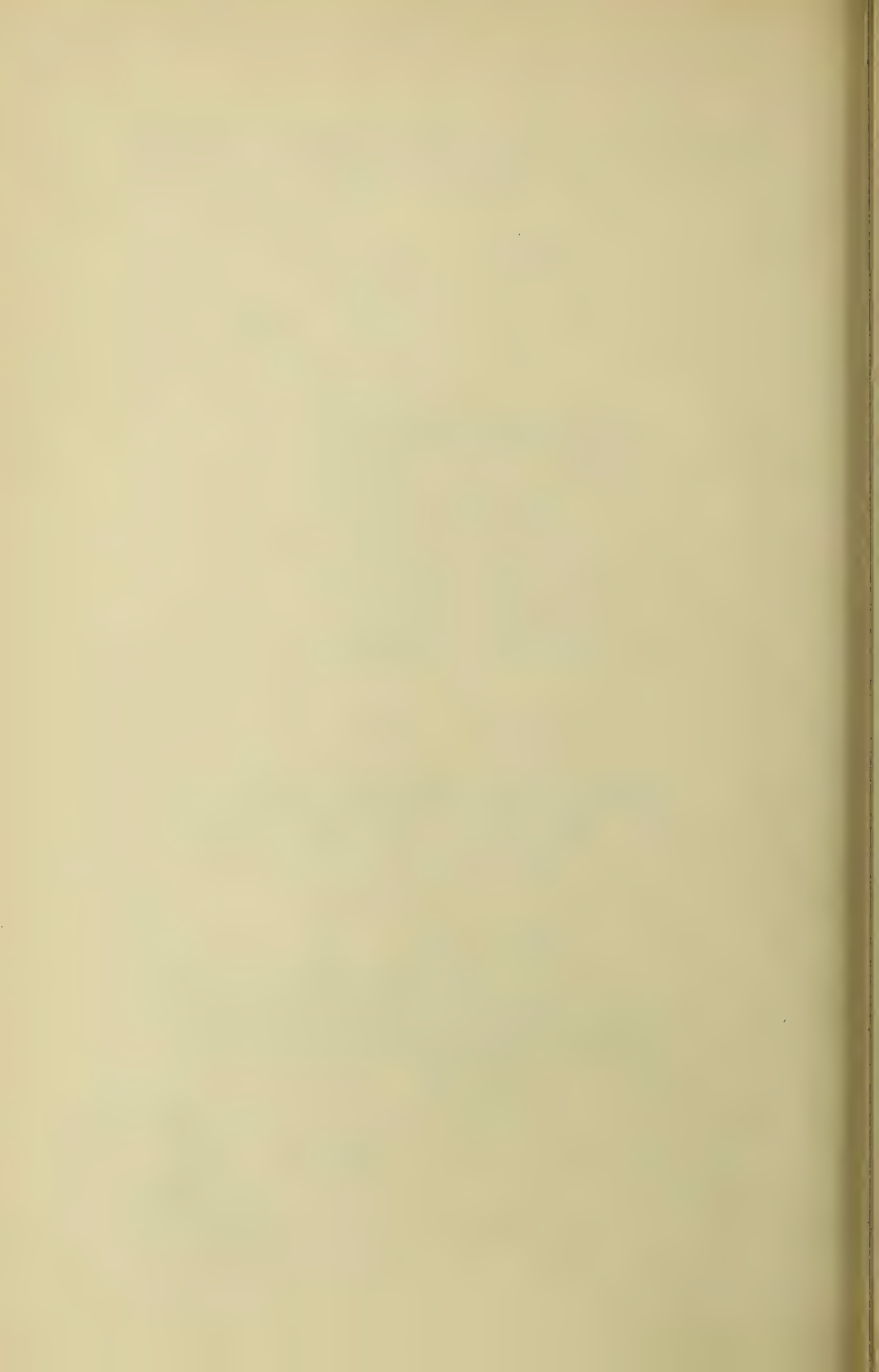
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Fig. 7

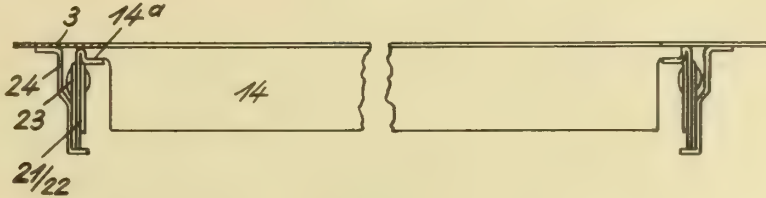
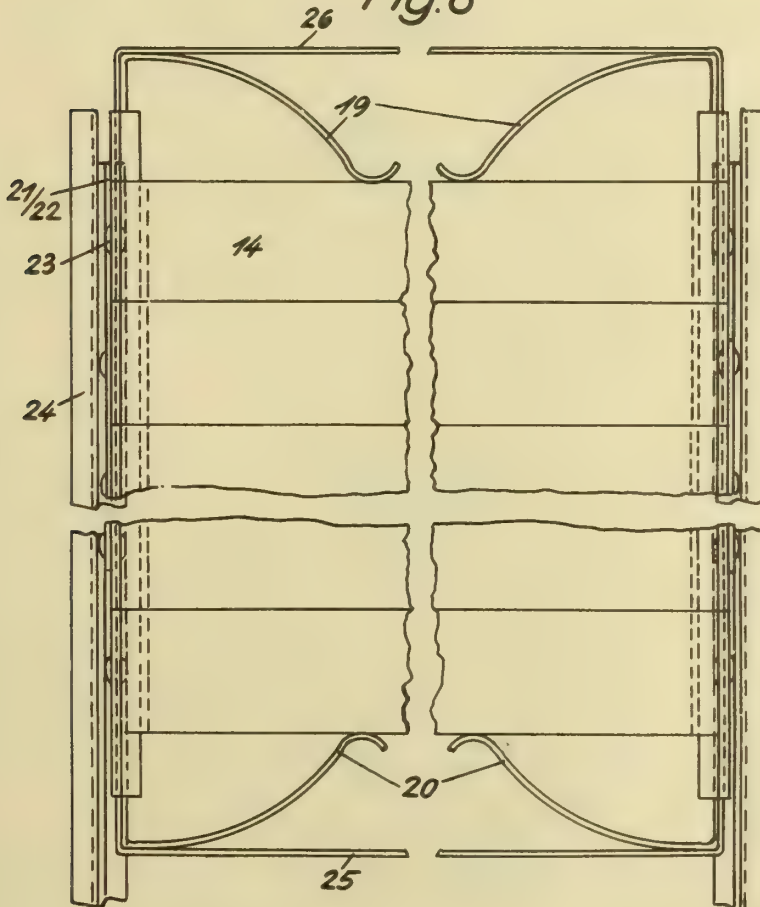


Fig. 8

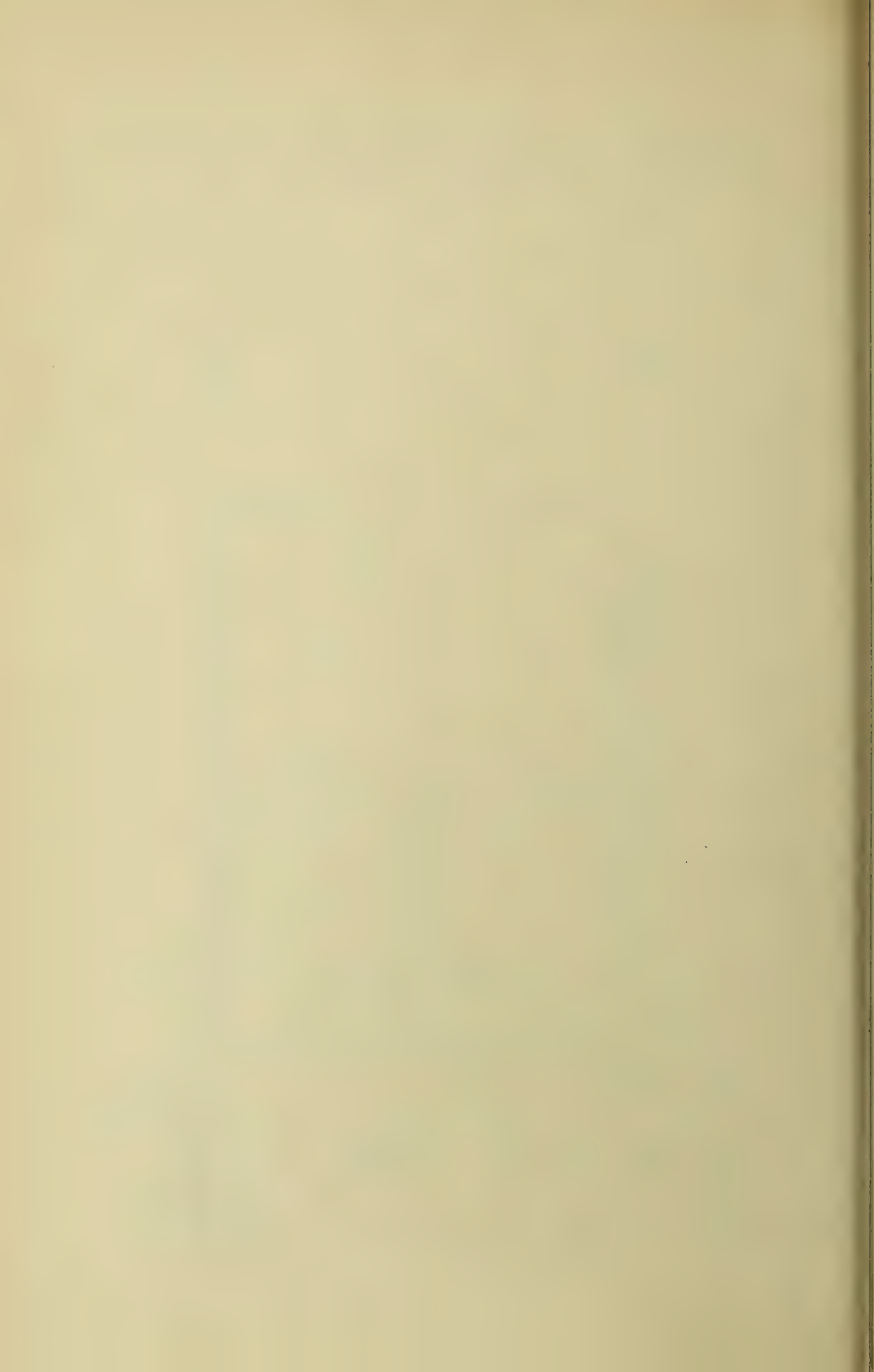


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9 Sheets-Sheet 4

Fig. 9

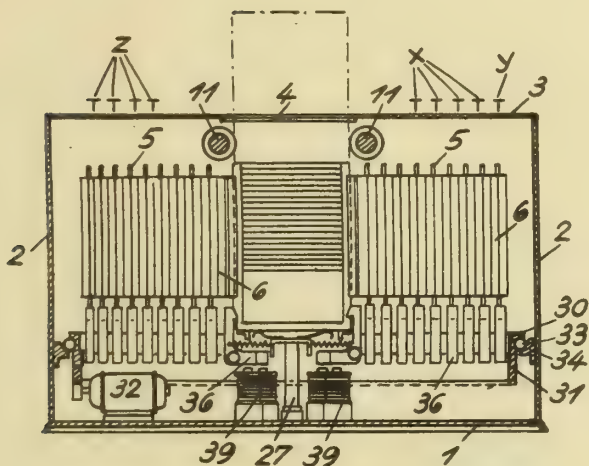
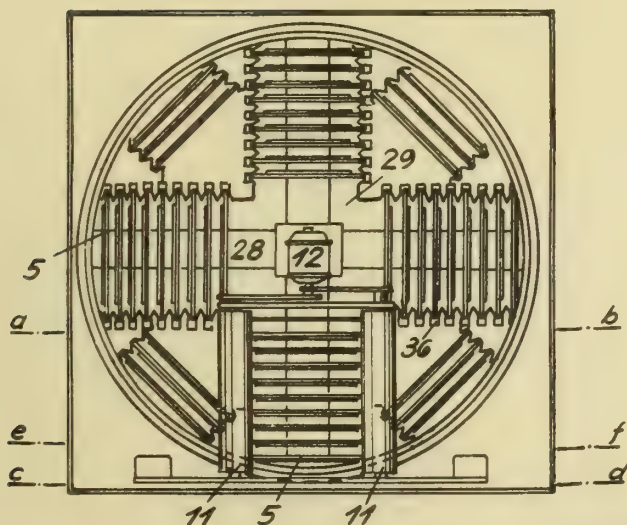


Fig. 10



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9 Sheets-Sheet 5

Fig. 11

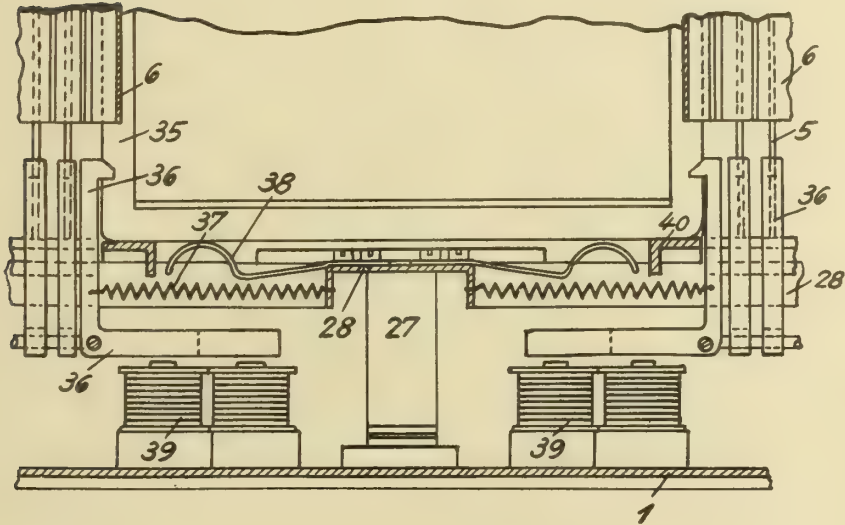
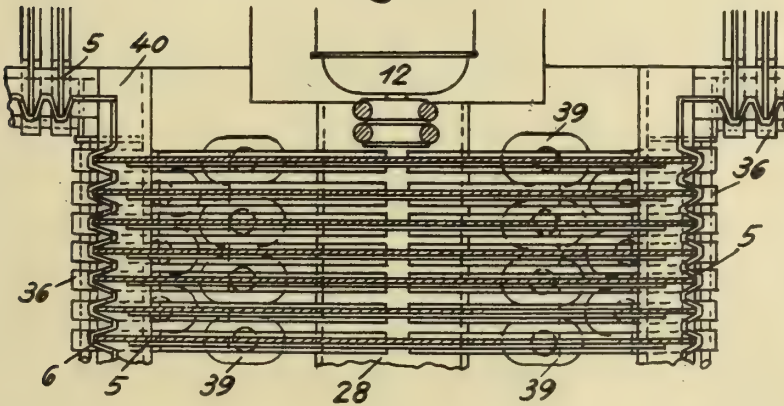


Fig. 12



Inventor

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By

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Attorney



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INDEX CARDS OR OTHER SUITABLE ARTICLES
IN CONTAINERS, OR THE LIKE
Filed March 13, 1940

Serial No.
323,734
9 Sheets-Sheet 6

Fig. 13

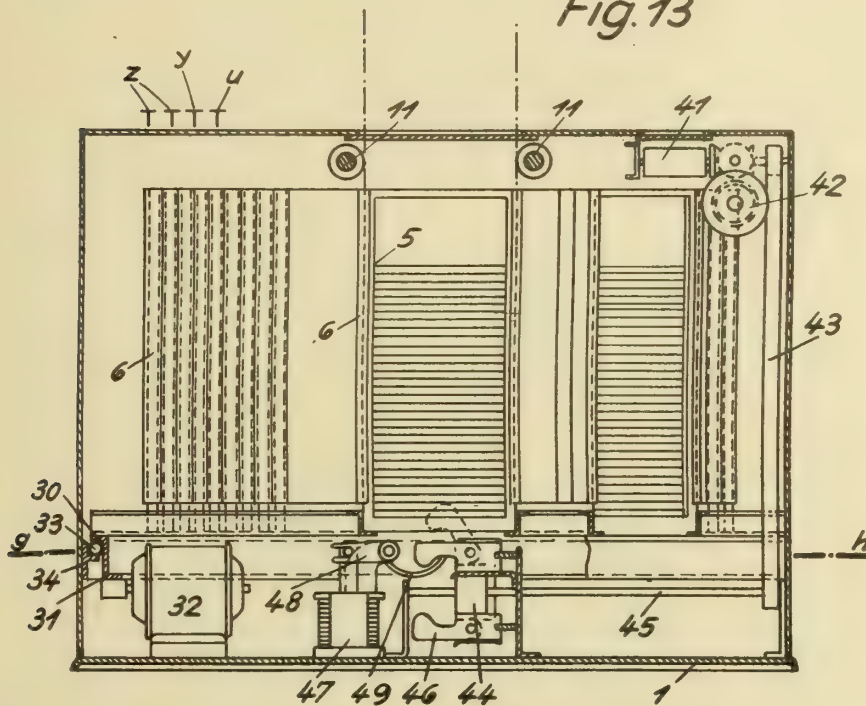
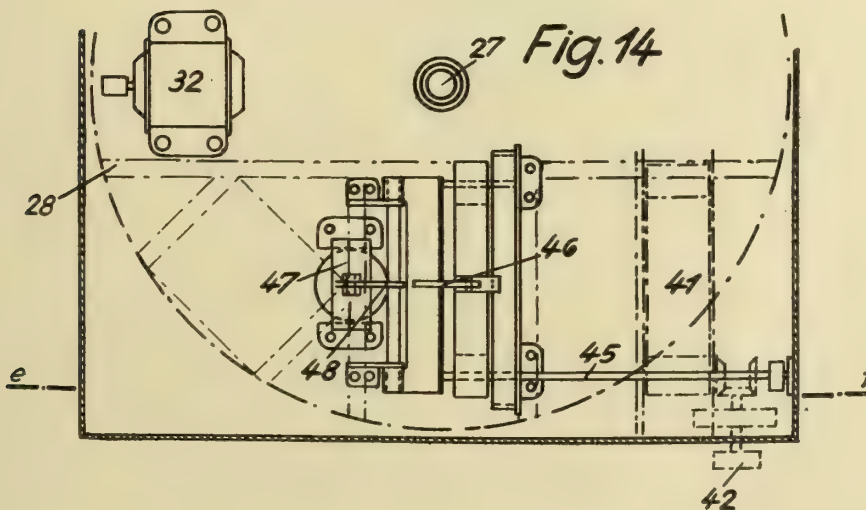


Fig. 14



Inventor

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Attorney

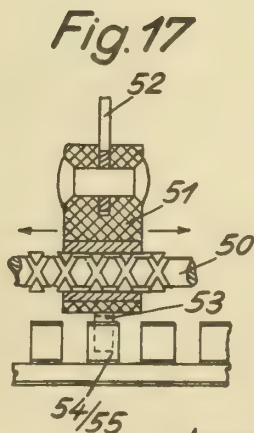
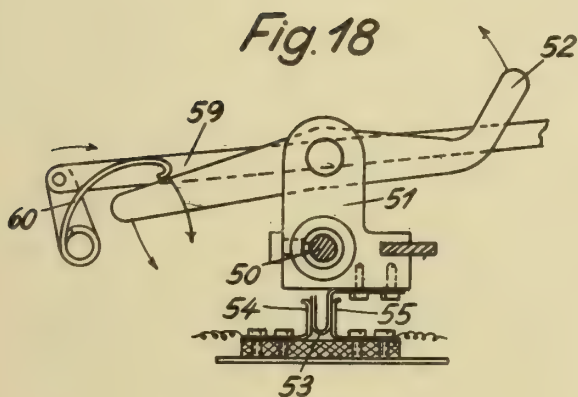
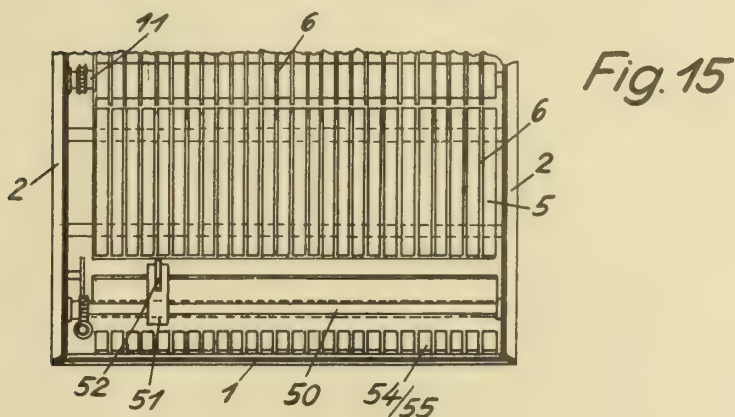
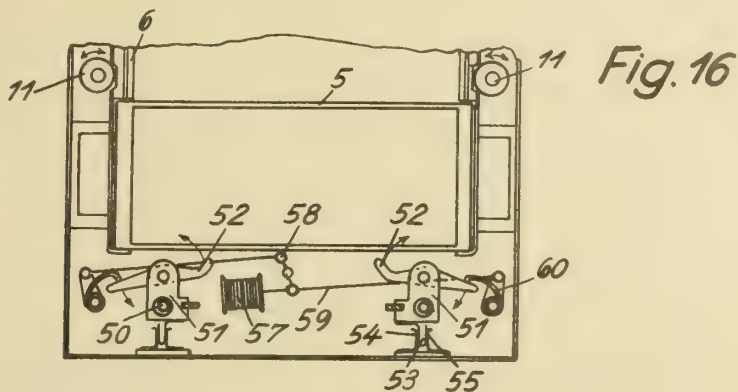


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9 Sheets-Sheet 8

Fig. 19

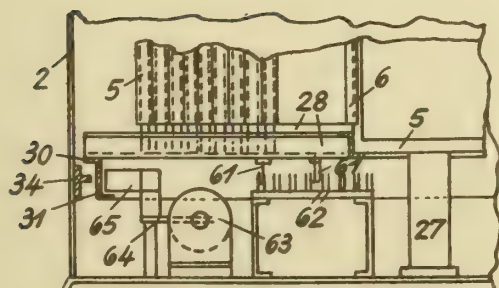


Fig. 20

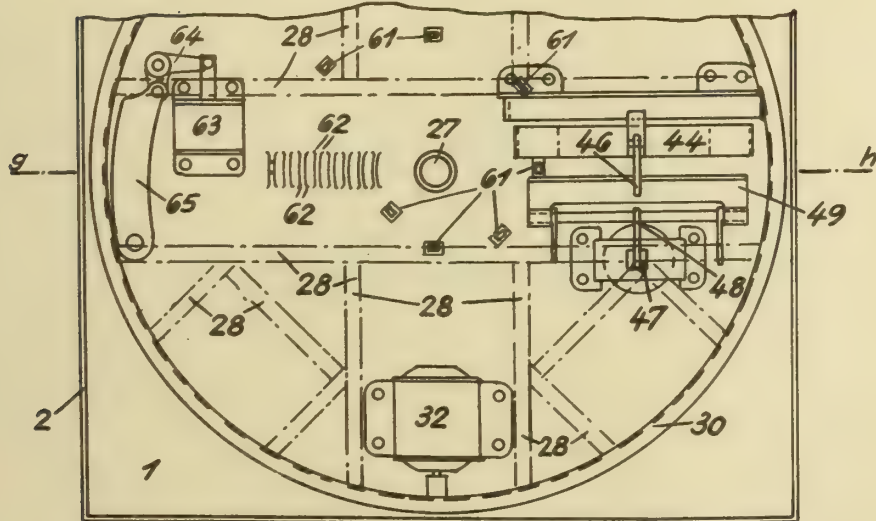
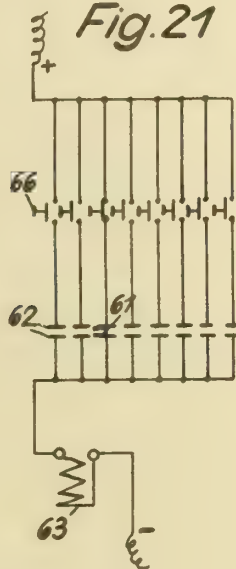


Fig. 21



By

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For
his Attorney

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9 Sheets-Sheet 9

Fig.22

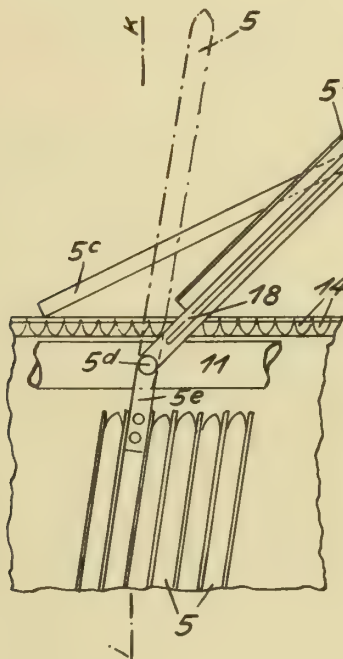


Fig.23

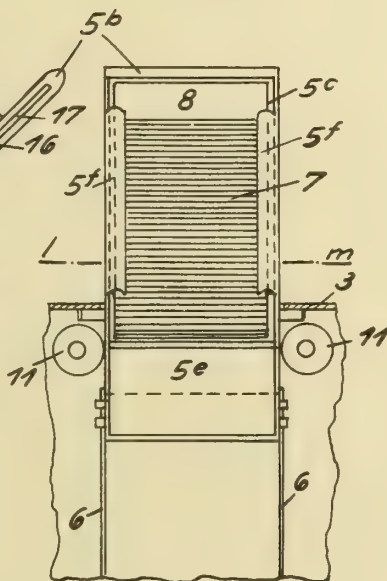
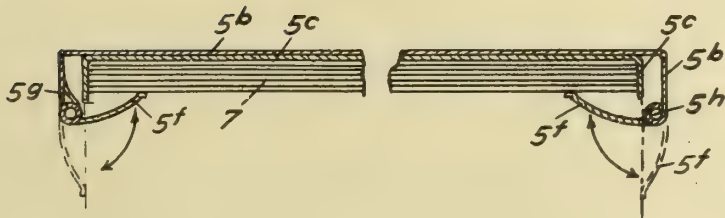


Fig.24

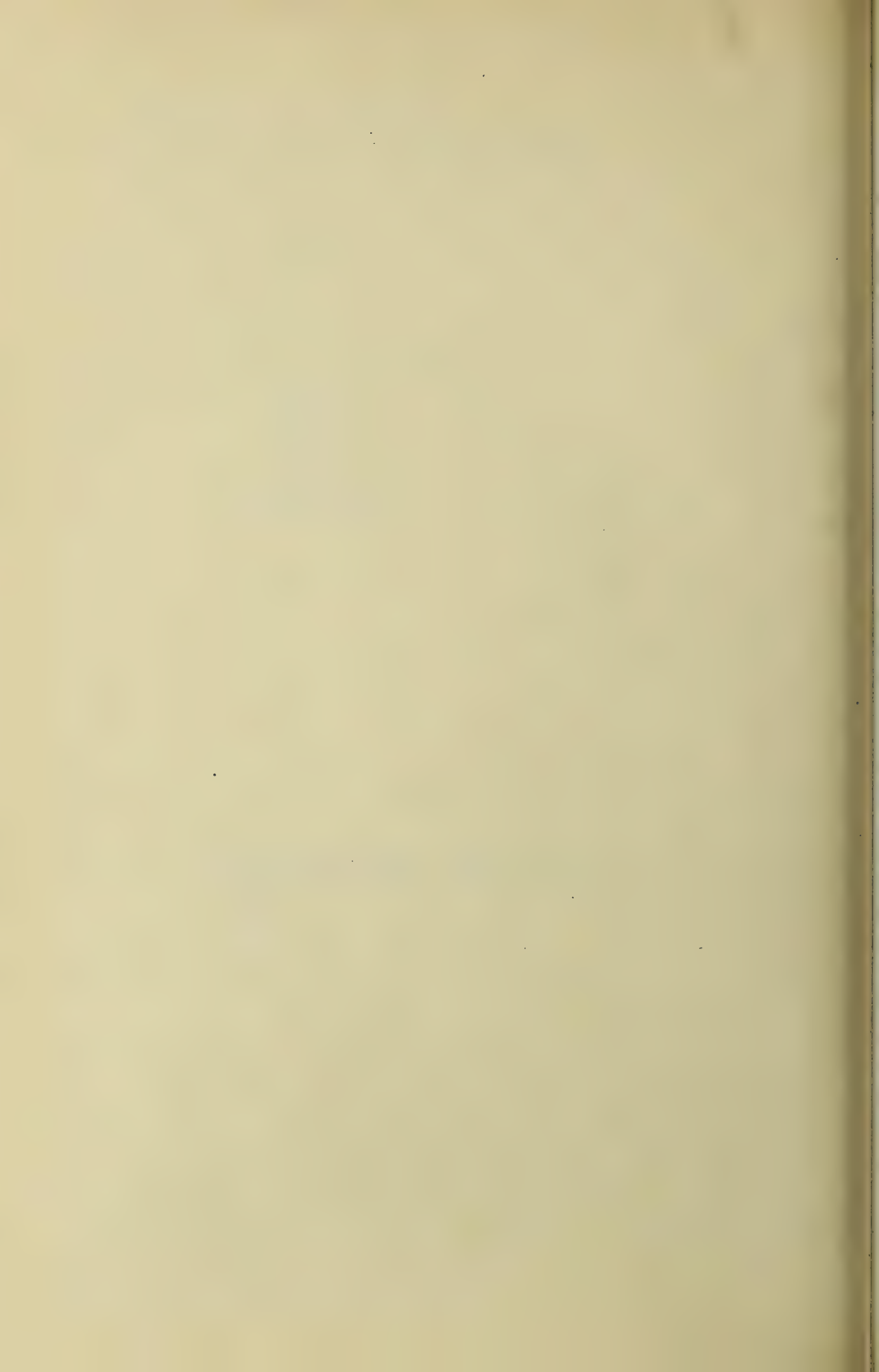


Inventor

O. A. Becker

By

Wm. H. Smith
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ALIEN PROPERTY CUSTODIAN

PROCESS OF MAKING ORNAMENTAL FIGURES

Enrico Bonfiglioli, Bologna, Italy; vested in the Alien Property Custodian

Application filed March 16, 1940

This application is a continuation-in-part of my application Ser. No. 50,978, filed Nov. 21, 1935.

The present invention relates to a process for producing ornamental figures from live plants and also to the figures produced by said process.

The process comprises the steps of shaping a wire member or the like to serve as a basis or core for the desired ornamental figure. The figures, of course, may represent animals, puppets, or any other desired article. After having formed the basic shape of the desired wire figure, a number of branches are placed about the wire either spirally or in parallel relationship therewith. The branches consist of the rhizome of a plant of the Polypodium fern family. Such rhizomes generally have the form of elongated bodies which sprout and they can, therefore be trimmed or cut without destroying the vitality of the plant. After having placed several of the branches of the rhizome about the wire structure they are secured in place by wrapping the branches spirally with a ligature which may be made of metal wire of a gauge smaller or lighter than the wire core. It is, of course, obvious that a series of separate windings of the ligature may be used instead of a spiral winding, but the latter is preferable since it consumes less time and material and is equally effective. The figure when completed may be suspended in the air and the rhizome will grow and sprout when sprinkled with water occasionally. It has been found that the rhizome of the Polypodium fern family which

normally grows in the soil may be kept alive in the air by merely watering if a plurality of the branches are bound together and thereby held in intimate contact with each other. If the branches of the rhizomes should be separately suspended in the air they will not grow or sprout. So, a characteristic feature of the invention is the particular method of placing rhizomes together so as to grow.

In the drawing, Fig. 1 discloses a completed figure which represents the body of a monkey,

Fig. 2 is a cross-section taken on the line 2—2 of Fig. 1 on an enlarged scale, and

Fig. 3 is a longitudinal sectional view of the same.

Referring now more particularly to the drawings, in which similar reference characters are employed in the several views, *a* represents the main body of the figure forming the trunk and head of the monkey. *b* indicates the arms, legs, and tail of the monkey and *c* the ligature serving to bind the branches *d* of the rhizome together about the wire frame *e*.

It can be seen in Fig. 3 that the branches *d* of the rhizome may be arranged in overlapping relationship along the wire frame *e* and in intimate contact with each other. This arrangement enables the branches to retain moisture and grow as they would in the soil.

ENRICO BONFIGLIOLI.

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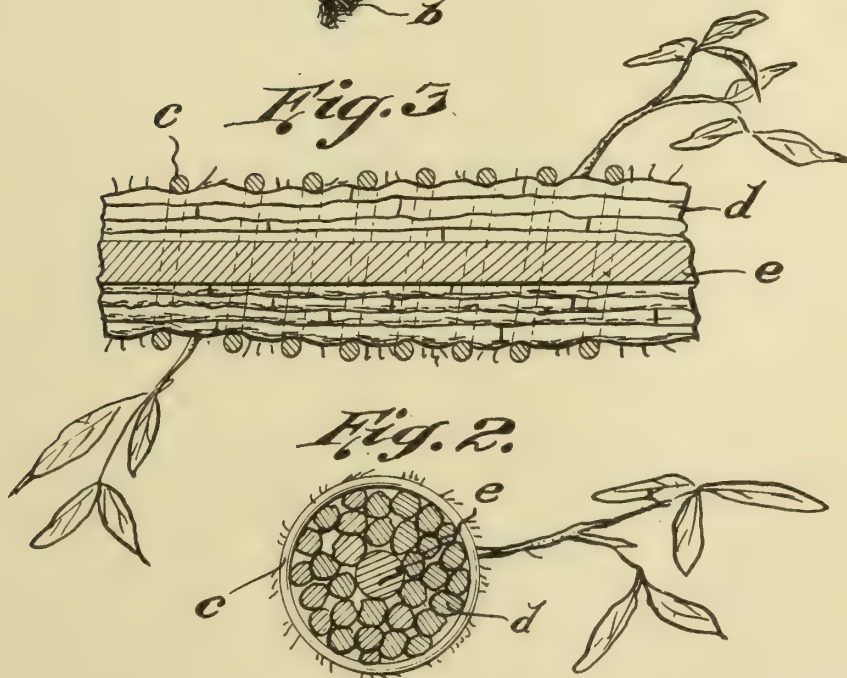
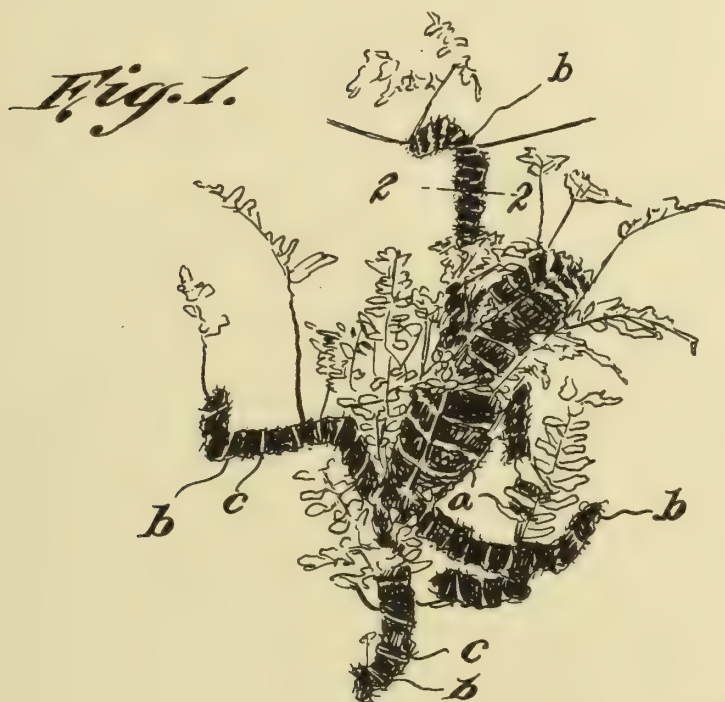
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PROCESS OF MAKING ORNAMENTAL FIGURES

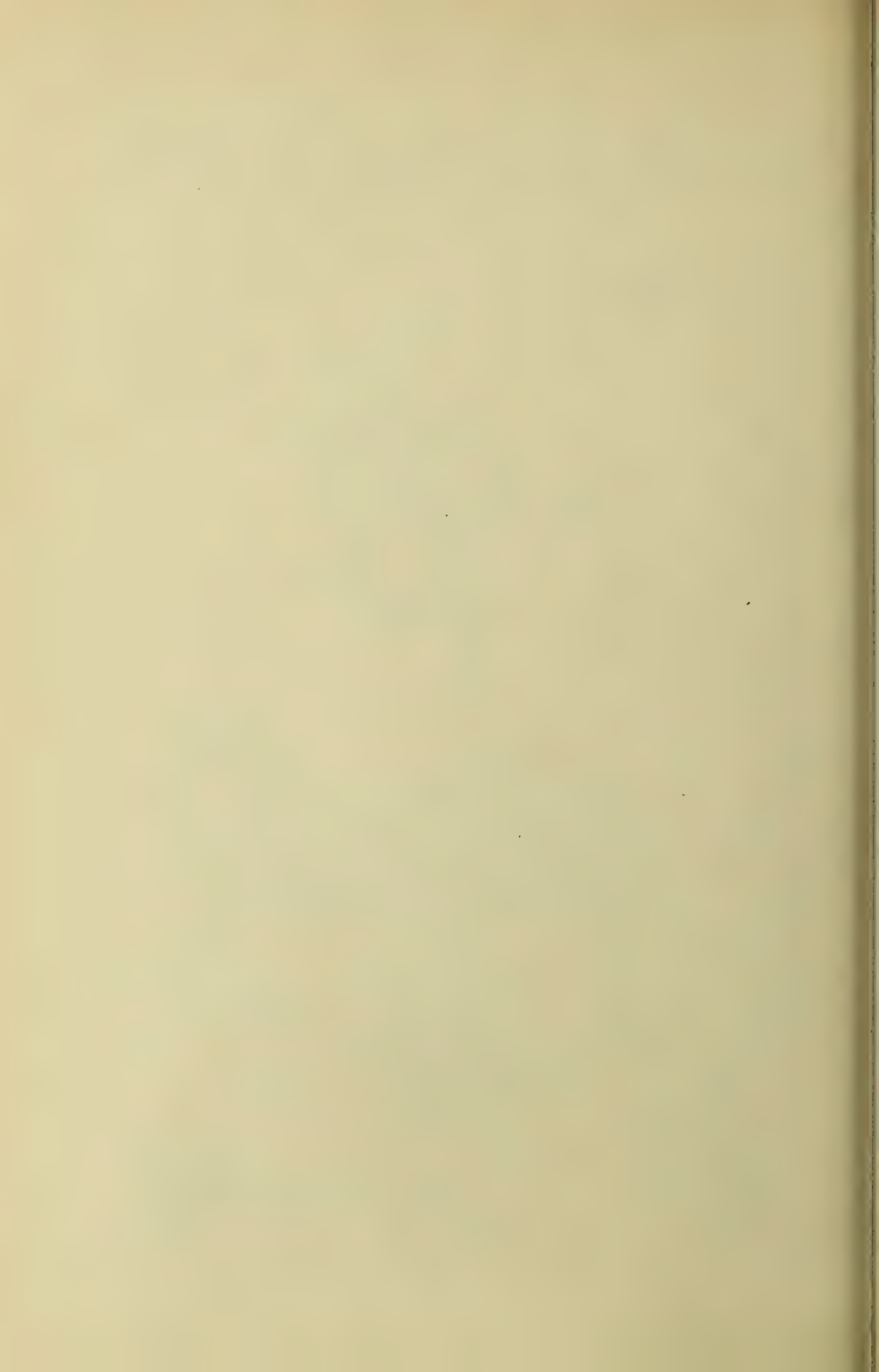
324,426

BY A. P. C.

Filed March 16, 1940



Inventor,
E. Bonfiglioli
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Attys.



ALIEN PROPERTY CUSTODIAN

MERCERIZING BATHS AND TREATMENTS WITH CAUSTIC ALKALI

Anton Volz, Ludwigshafen-on-the-Rhine, Germany; vested in the Alien Property Custodian

No Drawing. Application filed March 23, 1940

This invention relates to mercerizing baths and treatments with caustic alkali, containing reaction products of organic, aliphatic, aromatic and heterocyclic compounds with alcoholic or phenolic hydroxyls, with compositions of phosphoric acids poorer in water than orthophosphoric acid.

In textile processes use is frequently made of alkaline baths. There are, in addition to boiling out processes, mercerizing treatments and treatments with caustic alkali. Mercerizing generally is carried through at an alkali content of the liquor of 9% or higher than 9%, whereas in the process with caustic alkali the alkali content should preferably be lower than 9%. Mercerizing is characterized by the feature, that the treatment in aqueous alkali solutions is combined with a drawing process or a process to prevent shrinkage, in order to obtain by compensation of tensions in connection with chemical reactions a fibre-material being in a higher degree brilliant than grey-material. Treatment with caustic alkali, especially applied in the manufacture of cellulose wool, is to cause shrinkage, improvement and levelling of dye-stuff affinity.

In both cases it is desired that the fibres introduced into the lyes are uniformly steeped (wetted out), and that such untreated fibres, which are difficult to wet, sink down immediately. Different products have been proposed for said purposes, particularly phenols and combinations thereof with alcohols, tetrahydrofurfuric alcohol, naphthenic alcohol, terpene alcohol, pineoil, hydrocarbons, chlorinated hydrocarbons, amines, ketones, heterocycles, aliphatic alcohol sulphonates, fatty acid condensation products, protein condensation products and the like.

I have found that for these purposes also the reaction products of organic, aliphatic, aromatic and heterocyclic compounds with alcoholic or phenolic hydroxyls, with compositions of phosphoric acids poorer in water than orthophosphoric acid, for example pyrophosphoric acid, metaphosphoric acid, polyphosphoric acid, P_2O_5 , phosphorus and the like, are suitable.

As contrasted with sodium phosphates and organic esters of orthophosphoric acids, which do not sufficiently or not at all disperse in alkali solutions, and esters of triethylphosphate, which can only be applied within a very restricted range of concentration, the products of the present invention have the capacity of dissolving in alkali solutions of any concentration and of acting as wetting agents. By this quality they excel most

of the known mercerizing agents, which can only be employed within certain limits of concentration.

It is therefore an important progress to have found a mercerizing agent available for any concentration of lye. The new products have the further advantage of not being volatile. The baths prepared therewith consequently keep their properties and efficiency, even on standing for a longer time. Besides, these combined products show a better wetting effect than their components, and their constitution remains, even after days, the same, whereas cresolic lyes for example tend to condensation.

In addition, the products according to the present invention have another excellent quality consisting in the fact, that the phosphorus content of the bath exerts a favourable effect on the fibre, especially cellulose wool, in so far as breakage strength of the fibre at following rinsing is, even at critical alkali concentrations, much higher than with known mercerizing agents. Finally, the new products have dissolving properties for such material which slightly mix with lyes or tend to crystallization and condensation of the lyes, as for example xyleneol.

The new products may be employed either alone, or in combination with each other or with one or more of the known wetting agents. Moreover, products and combinations can be prepared, which cause: rapid wetting and immediate sinking down of the wetted material, shrinkage effect of any desired degree, differentiated preservation of the part of artificial fibres, whereby various effects of fibre mixtures may be obtained.

Example 1.—50 parts of ethylmetaphosphate are mixed with 50 parts of acetone; 20 ccm of this mixture are added to a 20% caustic soda lye.

Example 2.—15 g of the reaction product of 40 g of metaphosphoric acid with 108 g of cresol, and 5 g of ethylmetaphosphate are added to a 35% caustic soda lye.

Example 3.—10 ccm of the reaction product of 20 g of metaphosphoric acid with 108 g of cresol are added to a 20% potash lye.

Example 4.—20 g of the reaction product of 20 g of metaphosphoric acid with 122 g of xyleneol, are mixed with 10 g of triethanolamine, 30 g of ethylmetaphosphate and 40 g of the reaction product of 20 g of metaphosphoric acid with 108 g of cresol; 15 g of this mixture are added to one litre of caustic soda lye of 7° Bé.

ANTON VOLZ.



ALIEN PROPERTY CUSTODIAN

PRODUCTION OF HOLLOW PRODUCTS

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No Drawing. Application filed March 28, 1940

The invention concerns the production of hollow products of every kind, especially cylindrical, conical, ball-shaped, bladder-shaped and ellipsoidal hollow shaped products from sheets shaped accordingly, from cellulose derivatives.

It has already been proposed to produce hollow shaped cellulose products by treating a jelly-like skin of viscose, i. e. a strong alkaline film from cellulose xanthogenate, to begin with with a solution of sodium chloride, and then with a solution of zinc sulfate, zinc chloride, lead acetate or tin dichloride. During this treatment the skin is supposed to part in two or split in two lengthways, while the edges remain a combined whole. The skin thus doubled is blown up by inner pressure of a liquid injected into it, whereby a hollow product is obtained. This process, however, cannot be carried out, at least not in case undamaged hollow shaped products are wanted, because neither starting material nor treating agent are suited for carrying this process into effect.

According to the present invention it has been found that hollow shaped products can easily be produced from sheets shaped accordingly, for example cylindrical hollow products from ribbon-shaped sheets or ball-shaped hollow products from circular sheets, by using as starting material sheets from organic cellulose esters or ethers or from nitro cellulose, that is from cellulose derivatives free from sulphur, and in subjecting these sheets to partial saponification and simultaneous swelling. By this treatment on the one hand the sheets' strength is reduced from the outside towards the inside, or vice versa is increased from the inside towards the outside. Therefore the so treated bodies may by mechanical treatment be opened at the spot which is least resistant. Thus a hollow shaped product is obtained.

For the production of hollow shaped products sheets from organic cellulose esters, for example cellulose acetate, formate, propionate, butyrate, tolylsulfonate, or nitrocellulose, or mixed esters, for example nitro formate or butyryl acetate, or cellulose ethers, for example methyl, ethyl or benzyl cellulose are employed.

Preferably such sheets from cellulose esters are employed, which have been admixed with softening agents, especially phthalic acid, for example diethyl, dibutyl or dimethylglycol phthalate as they are known under the Trade Mark "Palatinol A, C or O", furthermore castor oil, paraffin oil, triphenyl or tricresyl phosphate.

In carrying out the invention the sheets, which somehow represent a cross section of the three-dimensional desired product, which, for example during the production of tubes represent a ribbon-like sheet, are subjected to partial saponification and simultaneous swelling, by which treatment their strength is reduced from the outside

towards the inside, or increased from the inside towards the outside. Their strength may be diminished or their compactness be changed to such an extent that it dissolves in the treating agent or in a constituent thereof. The treating agent is equally affecting both of the frontal sides as well as the edges of the sheet and is penetrating towards the centre of the sheet.

As treating agent a mixture of saponifying agent and swelling agent is used. According to the kind of starting material basic agents, for example sodium hydroxide, potassium hydroxide, soda lye, milk of lime, ammonia, amines or strong acids, for example sulphuric acid, hydrochloric acid or nitric acid are used. As swelling agents in almost all cases alcohols, such as methyl, ethyl or isopropyl alcohol may be employed. Solvents may be used for the sheet-substance as well, provided that their effect of solving is suppressed by a non-solvent to such an extent that only a swelling effect takes place. For swelling primary cellulose triacetate the following swelling agents or solvents are suitable: glacial acetic acid, chloroform or methylene chloride. For swelling secondary cellulose triacetate the following swelling agents or solvents are suitable: methylene chloride, acetone, methyl ethyl ketone, dioxane, benzyl alcohol, cyclo hexanon, methyl glycol and diacetone alcohol. For swelling cellulose nitrate acetone or other ketones or mixtures from alcohol and ether are suitable. For swelling formyl cellulose, pyridine, formic acid, furfural, glycol or ethylenechlorhydrine are suitable. In almost all cases hydrocarbons, such as benzene, toluene or xylene or water may be used as non-solvents. The solving effect of some of the solvents may be suppressed by alcohols which have swelling qualities. Sheets from cellulose triacetate being used carbon tetrachloride as well as ethers, for example diethyl, dipropyl or butylamyl ether may be employed. Sheets from formyl cellulose being employed the effect of the solvent may be suppressed by the addition of acetone.

In some cases one does not succeed in producing a homogenous mixture of the saponifying agent, the swelling agent and if desired, a non-solvent. In such cases a further solvent may be added, which has a homogenising effect on the mixture. For example in a mixture of sodium hydroxyde as swelling agent, methylene chloride as solvent and ethyl alcohol as non solvent, which mixture is suitable for treating sheets from cellulose triacetate, sodium hydroxyde sedates. If, however, methyl alcohol is added to this mixture, a homogenous mixture is obtained, which does not separate into layers.

When treating a sheet with such a mixture of saponifying agent and swelling agent or saponifying agent, solvent and non-solvent, if desired with the addition of a homogenising agent, the

swelling agent or solvent respectively is penetrating from the surface to the core of the sheet with a certain velocity, whilst the saponifying agent or the non-solvent, which suppresses the solving effect of the solvent or both of them are diffusing into the sheet with less rapidity. Sheets are obtained, which in their inner part are swollen or even solved to a far reaching extent by the swelling agents or the solvents respectively, while the strength of the edges, or, in other words, of the whole surface, is only slightly changed or even increased by help of the saponifying agent or the non-solvent respectively. Usually there is not an abrupt but a very gradual transition from the inside towards the outside.

This treatment being concluded it is very easy to split up the sheet at its least resistant spot, that is according to its shape either in the centre or along its axis or around a central plane. Thus a hollow shaped product is obtained. This may easily be effected by mechanical methods, such as rubbing or shoving one surface against the other, for example holding the sheet-like product between thumb and forefinger and then letting pass one's thumb over one's forefinger, or treating it between squeezing rollers or a wringing-machine. Another method consists in bulging out the treated sheet by passing through liquids or blowing it up by gases. There are two embodiments of the last method. Either liquid or gas are injected into the treated sheet from the outside, or gases are produced in the inside of the sheet, for example by adding liquid which is boiling at low temperatures, to the treating agent. This liquid penetrates into the inner part of the sheet and evaporates when the sheet is heated.

In many cases the hollow shaped products are, if desired after drying, ready for use. In some cases the insides of the bulged out shaped product tend to stick together and combine again. This tendency must be avoided by drying or rinsing, in order to destroy or wash out the sticky substance.

The hollow shaped products according to the invention may serve for various purposes according to their shape and to the kind of material they are produced from. Thus tubes are obtained from ribbon-like sheets, which may for example, according to the starting material, be used as fuel piping or artificial sausage skin. From circular or round sheets bladder-shaped hollow products are obtained, which may serve as hog bladders or balloons. Furthermore a great variety of seamless bags of every kind, which, for example may be made use of in the food industry, may be produced. There are of course, still many products, such as finger-stalls, gloves and so on, which can be produced in the aforescribed way.

Examples

(1.) Ribbons, cut from a sheet which is 5 mm strong, from secondary cellulose triacetate, are submerged into a bath which consists of 5 volumes of an aqueous solution of 30% sodium hydroxide, 55 volumes of methylene chloride, 20 volumes of ethyl alcohol and 20 volumes of methyl alcohol, for 5 minutes. During this treatment the following reactions take place:

The methylene chloride, which has a swelling effect on the cellulose triacetate is penetrating rapidly from the surface and the edges of the cellulose triacetate ribbon into its centre (inner part). The ethyl alcohol, which is suppressing

the solving effect of the methylene chloride to a far reaching extent, diffuses into the sheet with less rapidity. The sodium hydroxide solution, which serves as saponifying agent, is penetrating still slower. At the end of the treatment the sheet, which is now highly swollen, consists in its central inside of non or almost non saponified cellulose triacetate, which has been swollen in methylene chloride or even a solution of cellulose triacetate in methylene chloride. The layers lying between centre and surface consist of cellulose triacetate which is swollen to a lesser degree but saponified to a higher degree. Finally the sheet's surfacial layers consist of cellulose triacetate which has been saponified to a still higher degree and is only slightly swollen. The strength of the treated sheet is diminishing gradually from the outside towards the inside, the inner part representing even a solution of cellulose triacetate in methylene chloride. If, by experiment, such a sheet is thrown into a water bath, the temperature of which lies above the boiling point of the methylene chloride, the methylene chloride within the swollen sheet evaporates and blows up the ribbon-like sheet into a cylindrical or ellipsoidal product respectively.

For hollowing out the sheet another method may be used, by which it is treated between squeezing rollers or is cut open at one end, into which a jet of water is lead and passed through the sheet. By another embodiment the sheet is brought into a room heated to a temperature, which lies above the boiling point of methylene chloride. A tube-like product is received, which may, for example, serve as artificial sausage skin.

(2.) Sheet products shaped like a tub which is pressed together (tub=German "Butte" or "Bütte") are cut out of a sheet from cellulose triacetate. These shaped products are treated in a rotating fulling tub for 3 minutes with a mixture, which consists of 20 volumes of an aqueous solution of sodium hydroxide of 30%, 40 volumes of methylene chloride, 30 volumes ethanol and 10 volumes methanol. Hereafter this bath is led away from the fulling tub, which is filled again with hot water. The tubs are inflated and represent artificial tubs. When cooling down they collapse again. They may, however, be blown up again at any time, and be used as containers for meat products.

(3.) Rectangular sections of a sheet from cellulose nitrate are treated in a bath consisting of 66 parts of a mixture of 5 parts of alcohol with 3 parts of ether, 34 parts of Palatinol and 10 parts of an aqueous solution of sodium sulfide for 2 minutes. The mixture of alcohol and ether selected for the purpose has a strong swelling effect on the cellulose nitrate and penetrates into the sheet very rapidly. The softener, on the contrary, does not only reduce this swelling but even prevents it and diffuses rather slowly into the sheet. Finally the sodium sulfide splits off the nitro groups. The result is a sheet with a highly swollen or even solved core, which is surrounded by a number of layers, which according to their position, are still less swollen and still more dinitrated. After this treatment the swollen rectangular sections are brought into a steam of hot air, in which they are blown up and represent a bag-like product. The bags may be cut open on one side and closed by gluing or some other arrangement. They may be used as bags for explosives.

WALTER OPAVSKY.

ALIEN PROPERTY CUSTODIAN

MANUFACTURE OF NITRATES OF METALS OF THE ALKALINE METAL GROUP

Henry Johnsen, Notodden, Norway; vested in the
Alien Property Custodian

No Drawing. Application filed March 25, 1940

This invention relates to the manufacture of nitrates of metals of the alkaline metal group and has for its object a process by means of which it is made commercially possible to manufacture the desired nitrates in a solid form from readily available solutions of other nitrates and by the aid of inexpensive solutions of alkali metal salts other than nitrate.

The present application is a continuation in part of my pending application Serial No. 727,832, filed on the 26th of May 1934, which application is a continuation in part of my prior application Serial No. 618,942, dated 23rd of June 1932.

In the manufacture of nitrogen oxygen compounds from atmospheric nitrogen, nitrate solutions are obtained by reacting upon compounds of alkaline or alkaline earth metals with dilute nitrous gases or nitric acid obtained by the absorption of nitrous gases in water. Large quantities of sodium and calcium nitrates in a dry or solid form are produced by evaporation of the nitrate solutions so obtained.

In the conventional manufacture of calcium nitrate from synthetic nitric acid and limestone (or other calcium compounds, such as for example phosphate rock) the raw material is dissolved in a nitric acid of a strength of between 30 and 60 percent. The acid most frequently employed, however, has a strength of between 50 and 55 percent but under certain circumstances acid of a percentage as low as 20 percent is also sometimes employed.

The concentration of the resulting solutions of calcium nitrate will correspond to the concentration of the acid employed and will be between 30 and 60 percent when a nitric acid of between 30 and 60 percent has been employed to dissolve limestone. If the raw material is a dolomite or other limestone containing magnesium carbonate, the solutions will contain a corresponding percentage of magnesium nitrate. If the raw material employed is a phosphate rock the percentage of alkaline earth metal nitrate in the solution, resulting after the removal of phosphoric acid may sometime be as low as about 20 percent.

The sodium nitrate solutions obtained by the absorption of residual dilute nitrous gases in sodium carbonate usually contain about 20-30 percent (most frequently about 22 percent of sodium nitrate).

Sodium, potassium or ammonium nitrate may be obtained from the calcium nitrate solutions above referred to for example by double decomposition with sodium, potassium or ammonium sulphate and subsequent evaporation of the re-

sulting sodium, potassium or ammonium nitrate solution. In such a process large quantities of calcium sulphate (gypsum) are obtained as a by-product, which is of little or no commercial value. In addition, the obtained solutions of alkaline metal nitrates contain small percentages of dissolved gypsum, which complicates the recovery of the solid nitrates by evaporation.

Other methods for the conversion of nitrates of calcium or other metals into a nitrate of a different metal are also known. All of these prior methods, however, involve drawbacks and difficulties of various kinds and are not satisfactory from a commercial point of view, particularly in their application on the nitrate solutions above referred to.

In the process which is the object of the present invention important advantages are obtained as compared with the known process for the conversion of nitrate of one metal into a nitrate of a different metal.

An important feature of the process according to the invention consists in the use of a base-exchanging substance (of the zeolite or permutite type) as a means to bring about the conversion of nitrates contained in solutions of the nature above referred to.

Another important feature of the invention consists in the method of operation according to which three different solutions—viz. a nitrate solution of a considerable degree of concentration, a washing liquid free from substances which would contaminate the products to be obtained, and a regenerating solution of an alkali metal salt other than a nitrate—are passed in continuous sequence and in immediate contact with one another in a downward direction through a comparatively high layer of the base-exchanging substance.

Other important features of the invention will appear from the following description.

The described process is particularly adapted for the manufacture of alkaline metal nitrate but it is applicable also in the manufacture of other metal salts.

An important application of the process according to the invention consists in the manufacture of sodium or potassium nitrate from calcium and/or magnesium nitrate and sodium or potassium chloride.

Another important application of the invention is the manufacture of potassium nitrate from sodium nitrate and potassium chloride or sulphate.

A further application of the process consists in

the conversion of sodium nitrate and ammonium carbonate and sodium or potassium chloride into ammonium nitrate and sodium or potassium carbonate as an intermediate step in the manufacture of sodium or potassium nitrate from nitrous gases and alkaline metal chlorides, as described in my prior application, Serial No. 618,943.

When the invention is employed for the manufacture of sodium nitrate from a calcium nitrate solution, one may for example proceed as follows:

To commence with, one has a calcium nitrate and a sodium chloride solution, also zeolite saturated with sodium salts, in other words, sodium zeolite. The zeolite must be of a quality through which liquids easily penetrate, and must be composed of grains of a suitable size (for example 0.4–0.8 mm diameter). It is placed inside a container that may be a few metres high, and is deposited on a perforated plate or the like. The major part of the space in the container is occupied by the zeolite, which forms a horizontal surface at the top. In the upper part of the container there are devices for the liquid supply, and at the bottom there are outlet devices, through which the liquid may be discharged.

When starting the process, the container is filled with water that is particularly free from air, until it reaches just above the surface of the zeolite. The best way of carrying out the first filling process is to press the water slowly through the zeolite from below, thus eliminating the air from the interstices of the zeolite layer.

In order to avoid the formation of air bubbles while the process is in operation, all the liquids supplied to the container are first rendered free from air to the greatest possible extent, for instance, by placing them under vacuum. Air bubbles have the effect of lowering the efficiency of the plant. This is at least in part due to the fact that the bubbles obstruct the passage of liquid between the zeolite particles, thereby retarding the flow through the zeolite bed, causing disturbances in the uniform movement of the various layers of liquid (see later). Owing to the fact that vacuum sometimes occurs in certain parts of the zeolite bed, gas bubbles may be formed in the flowing liquid even if gas is present only in a dissolved condition in any one of the liquids which pass through the zeolite bed or beds. It is of great practical importance therefore that the liquids are free from gaseous constituents before they are subjected to the zeolite treatment. By means of suitable devices care is taken that the level of the liquid remains practically stationary through the entire process, that is to say, just above the surface of the zeolite. When the apparatus is in operation, the zeolite will thus remain in liquid all the time. For supplying the liquids while the process is in operation, a suitable spraying or distributing device is installed at the top of the container, having several outlets just above the surface of the layer of zeolite and evenly distributed above it, but under the level of the above mentioned liquid.

After the container has been filled with water, a calcium nitrate solution of a considerable degree of concentration is supplied through the aforementioned sprayers to the layer of sodium zeolite. The solution is evenly distributed over the surface of the zeolite and sinks downwards, displacing on its way a corresponding quantity of water, which runs away at the bottom of the container. During this process, the calcium from the nitrate solution gradually is incorporated in the zeolite, calcium zeolite being formed, whilst

sodium in equivalent proportions is forced out of the zeolite, sodium nitrate being formed in the solution. During the operation of the process an equally large quantity of liquid is discharged from the bottom of the container as that which is supplied to the zeolite at the top of the container.

At this stage in the process there is a nitrate solution on top and water just beneath it, and the liquids move gradually downwards through the zeolite. When a suitable period has elapsed, the supply of calcium nitrate solution is interrupted, water being supplied through the spray device instead. After a certain time there will thus be three different layers in direct contact with each other moving downwards through the zeolite, viz. first water, then the nitrate solution and finally water. As the nitrate solution now comes continually into contact with sodium zeolite that has not been converted, it will gradually become more enriched with sodium nitrate, whilst the quantity of calcium nitrate decreases. After fresh water has been supplied at the top of the container for a brief period, the water is turned off, and a sodium chloride solution is added, this having the effect of regenerating the used zeolite. When the regeneration is wanted to be as thorough as possible, a considerably larger quantity of this solution is used than of the nitrate solution. The difference in volume becomes still more marked, if a diluted sodium chloride solution is used, for instance sea water, which has been found to be suitable for this purpose in spite of the fact that it contains a plurality of different salts.

Under the assumption that a sufficiently high layer of base-exchanging substance is used, the following layers of liquid pass through the zeolite, counted from the top to the bottom: (1) chloride solution, (2) water, (3) nitrate solution, (4) water.

By degrees, as the layers move through the zeolite, the quantities of Ca in the chloride solution and of Na in the nitrate solution increase. After the water has been discharged from the bottom of the container, the nitrate solution flows down and is collected and evaporated, whereby the sodium nitrate is crystallized out. The mother liquor which chiefly contains calcium nitrate, and to which fresh quantities of calcium nitrate may possibly be added, is re-employed in the process.

The reason why a layer of pure water is inserted between the nitrate solution and the chloride solution is because this prevents the solutions from becoming intermingled. Consequently, the layer of water in principle ought to be so high that chloride and nitrate that diffuse into the water from each side do not reach the middle of the layer of water by the time it gets to the bottom of the container. In other words, there must still be some water left in the middle of the layer.

When collecting the nitrate solution, it will be possible to prevent any loss of nitrate by collecting at the same time half of the layer of water.

In order to prevent too great a dilution of the nitrate solution, such large quantities of water are not generally employed that complete separation of the nitrate solution and the chloride solution is obtained. The extent to which this is done largely depends upon how pure a quality of salt is required.

The chloride solution, which contains calcium chloride, obtained after the regeneration of the

zeolite, is also collected separately and may be evaporated, whereby calcium chloride and sodium chloride are obtained, the latter being reemployed in the process.

If sea water is used for regeneration purposes, the resulting calcium chloride solution becomes so diluted that it is sometimes considered worthless and is allowed to run to waste.

When the sodium chloride solution has been supplied to the zeolite at the top of the container for such a long time that the latter has become regenerated, clean water is again turned on, thereupon the nitrate of lime solution, then water, and then again the sodium chloride solution etc. as described above.

In this manner it is possible, by means of the zeolite and a sodium chloride solution, for instance sea water, to convert nitrate of lime into sodium nitrate in a continuous process.

Example

A cylindrically shaped container of an internal diameter of 1.5 metres is filled with zeolite (of a particle size between 0.4 and 0.8 mm) placed on a perforated plate. The height of the layer of zeolite is 6.4 m., and the gross volume thereof is 11.3 cubic metres. When the container is filled with liquid, which just reaches above the zeolite, the volume of the liquid is 80 per cent of the gross volume of the zeolite, or—in other words—it is 9.05 cubic metres.

At the commencement of the operation the zeolite consists of sodium zeolite, and the container is filled with water so that it covers the zeolite.

First, 2.11 cubic metres of calcium nitrate solution containing 52 gr. of $\text{Ca}(\text{NO}_3)_2$ per 100 cubic cm., that is 1100 kilos of $\text{Ca}(\text{NO}_3)_2$ in all, is supplied at the top of the container, and while this is in progress, 2.11 cubic metres of water is discharged from the bottom of the container.

Immediately the supply of nitrate solution ceases, 1.45 cubic metres of water is supplied at the top of the container, and directly after that, 4.75 cubic metres of sodium chloride solution containing 26 gr. of NaCl per 100 cubic metres, that is 1230 kilos of NaCl in all. Immediately after that, 1.6 cubic metres of water is supplied, then again 2.11 cubic metres of calcium nitrate solution. All the liquids supplied at the top of the container pass through the zeolite at a speed of 5 metres per hour. While passing through the zeolite, salt from the solution diffuses into the layers of water. In the present instance, the volume of water which was in the container at the commencement of the operation was 9.05 cubic metres. Had there been no diffusion, 9.05 cubic metres would have been discharged from the bottom of the container before the first nitrate ions could have been detected in the outlet, and the whole of the nitrate solution would have been contained in the same volume as before, i. e. 2.11 cubic metres, which could easily have been collected separately in the form of a nitrate solution.

Instead of allowing 9.05 cubic metres of water to flow away before collecting the nitrate solution, the collection thereof is begun—on account of the diffusion—as soon as 8.325 cubic metres has flown away, that is to say 0.725 cubic metres of the liquid is taken out prior to the original volume of the nitrate solution. Likewise, 0.725 cubic metre is removed after the original volume. In other words, 0.725 cubic m.+2.11 cubic m.+0.725 cubic m. is collected, this equalling 3.56 cubic m. in the form of a finished nitrate solution.

The attached diagram shows diagrammatically the conditions prevailing in the container at the moment the collection of the nitrate solution commences.

The collected nitrate solution (3.56 cubic m.) contains 728 kilos of NaNO_3 , 312 kilos of $\text{Ca}(\text{NO}_3)_2$ and 7 kilos of NaCl . Thus, about 70 per cent of the quantity of nitrate present in the solution is composed of sodium nitrate. About 5 per cent of the nitrate ions supplied are lost on account of the diffusion.

When evaporating the nitrate solution, about 90 per cent of the sodium nitrate present is obtained by crystallization. The mother liquid is then re-employed in the process as a nitrate charge.

Directly the nitrate solution has been collected 0.725 cubic m.+4.75 cubic m.+0.725 cubic m. equaling 6.2 cubic m. is collected in the form of a chloride solution. From the latter, calcium chloride can be produced. The sodium chloride thereby obtained is re-employed in the process for regenerating of the zeolite.

The quantity of water supplied at the top of the container after the sodium chloride solution may easily be greater than 1.6 cubic m. This is especially advantageous when desiring to produce nitrate that is as free as possible from chloride, because the greater the quantity of water used, the more effective is the washing out of the chloride from the zeolite.

When large quantities of water are supplied between the solutions, the middle part of the volume of water that is free from salt may be allowed to run to waste, the first and last parts being collected together with the adjoining solutions; by this means it is possible to avoid unnecessary dilution of the solutions.

Instead of only one container, it is also possible to use two containers or more. This is particularly advantageous when the sodium chloride solution used consists of sea water. In this case, very large quantities of sea water are needed for the regeneration process. The process can then be carried out advantageously in the following manner:

The regeneration is effected in one or more containers at a time by conducting sea water through the container or containers at a speed that is several times as high as that at which the calcium nitrate solutions or layers of water respectively pass through other containers, in which the conversion of the $\text{Ca}(\text{NO}_3)_2$ into 2 NaNO_3 simultaneously takes place.

When using several containers, higher degrees of concentration of the nitrate are attained, provided only the middle, most highly concentrated part of the solution obtained from the container is collected, the less concentrated parts—coming before and after the middle part—being used as admixture in the other containers before and after a fresh supply of nitrate solution. By this means, it is possible to avoid any loss of nitrate.

When several containers are employed, the degree of conversion can be heightened by the following method:

The portion of nitrate solution supplied to a container is made say three times as large as that which is suitable, when only one container is employed. Only the first, more thoroughly converted part of the solution is collected as a finished solution after conversion has taken place in the container, whereupon the remainder or a suitable part thereof is conducted to another container containing newly regenerated zeolite.

To this container a concentrated calcium nitrate solution that has not been converted is then immediately supplied.

This can be repeated several times so that from container No. 2 only the first, more thoroughly converted, part of the solution is collected, the remainder or a suitable part thereof being transferred to container No. 3, containing newly regenerated zeolite etc. The degree of conversion will thus rise as nearly as possible to the state of equilibrium.

By combining the two mentioned methods, it is possible for the collected finished nitrate solutions to attain the highest possible degree of concentration and the highest possible degree of conversion.

When sea water is used as a regenerating solution the reuse of withdrawn solutions in the container will result in enriching the magnesium salts in the solutions passing through the containers and withdrawn thereupon.

Contrary to previously known methods, it is not the chief aim of the present process to attain complete conversion by means of the exchange of bases. It has, in fact, been found to be perfectly sufficient for an economic effectuation of the process, if conversion of 60 per cent is acquired.

The zeolite is not absolutely insoluble under the conditions described above. A part of it, therefore, becomes lost during the operation of the process. The solubility and consequently the loss is dependent upon the salt content in those liquids which pass through the zeolite, and it is therefore the clean water that dissolves the greater part.

It further appears that the silicic acid in the zeolite is more easily dissolved than the aluminium oxide, and this applies both when the zeolite is immersed in water and when it is contacted with salt solutions.

I have ascertained that the loss of zeolite can be reduced practically to nil, if a small quantity of a soluble silicate, for instance sodium silicate, is admixed to the water used in the process. Silicate can also be admixed to the solutions used, provided they do not already contain a sufficient quantity of silicic acid. It is especially advantageous to admix silicate to the sea water used for the regeneration of the zeolite in the production of sodium nitrate and to the freshwater employed between the salt solutions (nitrate and chloride solutions). Usually no silicate need to be added to calcium nitrate solutions of the character and origin above specified.

I have found it sufficient, in order to reduce the loss of zeolite to a minimum, to admix such a quantity of silicate that the water, and preferably the solutions too, contains 5-20 mgr. of SiO_2 per litre. A suitable amount of SiO_2 may for example be about 5 mg (total) to the litre of sea water and for example about 15-20 mg of SiO_2 (total) to the litre of freshwater.

As it will be understood, the process described above can be used for a wide range of different salts, provided the salts cannot react with each other, unless base-exchanging substances are used. In the example described above, sodium chloride and calcium nitrate are used, which do not generally, that is to say, without the application of base-exchanging substances, react with each other to form sodium nitrate or calcium chloride with such a yield that the process is practicable from a technical point of view.

As already mentioned the process according to the invention may be used with advantage as an intermediate step in the manufacture of alkaline metal nitrates from dilute nitrous gases. When this is done, one may proceed as follows:

Nitrous gases obtained by the catalytic oxidation of ammonia are passed through large percolation containers, wherein the nitrogen oxides are absorbed in water to obtain nitric acid.

The residual gases are treated with a soda solution, whereby a solution of sodium nitrate results.

The sodium nitrate solution is then passed through a layer of ammonium zeolite, whereby sodium zeolite and ammonium nitrate result.

The sodium zeolite is regenerated to ammonium zeolite by being contacted with ammonium carbonate solution. The sodium carbonate solution obtained by the zeolite treatment is thereupon employed to absorb further quantities of dilute nitrous gases.

The ammonium nitrate solution is reacted upon with lime or limestone to obtain nitrate of lime which is then treated in a zeolite container in the same manner as described in the above example, using a sodium chloride solution (f. inst. sea water) as a regeneration liquid for the zeolite. Sodium nitrate may be recovered from the solution in a solid form by evaporation and crystallization.

The same process may be used to produce potassium nitrate instead of sodium nitrate. In this case a solution of a potassium salt is used as a regeneration liquid for the zeolite.

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ALIEN PROPERTY CUSTODIAN

PROCESS AND DEVICE FOR THE UTILISATION OF THE HEAT LOST BY INTERNAL COMBUSTION ENGINES

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Application filed March 29, 1940

The present invention relates to a process for the utilisation of the heat lost by internal combustion engines. Object of the invention is equally a device allowing the realisation of said process.

The invention aims at the rational utilisation of the heat abandoned by internal combustion engines as well in the circulating water as in the discharging gases by employing said heat for actioning a turbine installation fed by the vapours of a fluid with a high molecular weight and peculiar thermodynamic characteristics.

A form of realisation of the invention is illustrated in the accompanying drawing in which the only figure schematically shows an installation where the heat is utilised for actioning a turbine.

With reference to the drawing the internal combustion engine 1 is cooled by circulating distilled water conveyed to the usual cool water jackets 2.

The water possesses at the admission a temperature generally higher than 50° C, for instance 65° C, but the temperature may also descend below said limit. The circulation of the water is actively produced by a pump 4. At the outlet the water is introduced, through a laminating valve 3 into a further heater 6 while the discharge gases of the motor are conveyed to a chamber 5 of the same heater and heated through the smoke tubes 7 where they also heat the warm water admitted from the jackets into the same boiler 6. At the outlet of the boiler 6 the water may have a temperature below 100° C.

As well within the jackets 2 as in the boiler 6 the water is kept under a pressure higher than the one of ebollition. From the boiler 6 the water after separating the heat transmitted by the jackets as well as by the discharge gases, flows into a receptacle 10, where it is stationary for a certain time though in continuous active circulation; from said receptacle the water flowing through a gas expeller 13 passes to a pre-heater 14. From this pre-heater 14 by means of a circulating pump 4 the water is sent back to the jackets 2 of the motor. In the receptacle 10, constituting the evaporator of the fluid with a high molecular weight, the water yields a part of the heat absorbed by the motor to evaporate the weighty fluid. This fluid is injected within the warm water minutely fractioned and since it has been selected among those not mixable with water, a species of emulsion is formed with water. In the receptacle 10, then the weighty fluid evaporates within warm water and in consideration of the pressure of the saturated va-

pours of the fluid, the partial pressure of the water steam in the receptacle 10 may be regarded as neglectable with respect to the pressure of the fluid. The vapours of the fluid produced by the generator 10 operate through the tubing 15 a steam turbine 16 which drags an alternator or another operating machine 17 or the same driving shaft of the internal combustion engine. The steam discharged by the turbine through the tube 18 is admitted into a condenser 19 fed by refrigerating spring water, sea water or the like which is admitted for instance at 15° C and discharged at 20° C. From the condenser 19 the fluid condensed crosses the coil pipe 22 of the pre-heater 14 and is sent back again minutely fractioned into the boiler 10 by the pump 23.

The warm water of the evaporator 10, being cooled after yielding heat to the fluid evaporating therein, passes, as mentioned, into the gas expeller 13, where it is brought under a pressure lower than the one reigning in the chamber 10 and consequently loses a part of the gases the same water had dissolved. These gases are directly conveyed into the condenser 19. The water after the expulsion of the gases acquires again at the expense of the kinetic energy a part of the original pressure after flowing through the pre-heater 14, the pump 4 restores the original pressure and is sent back into the jackets 2. Nevertheless in the jackets 2 as well as in the boiler 6 and in the evaporator 10 there reigns an only pressure that is the one of the weighty fluid much higher than the partial pressure of the water.

The characteristic feature of the system described is the following.

The heat carried away from the cool water jackets of the internal combustion engine as well as the one carried away through walls by the outlet gases of the motor are collected by an only circulating water current. This heat collected serves to directly evaporate, within the water and in a convenient receptacle 6 a fluid capable of driving a pure action turbine. This fluid selected among those not mixable with water has a high molecular weight according to the principle that a saturated vapour when adiabatically expanding between two temperatures acquires discharge speeds inversely proportional to the square root of the molecular weight and consequently acquires speeds remarkably lower than the speed of steam between the same end temperatures allowing the use of an action turbine with one wheel and a simple crown of blades in the conditions of the highest efficiency that is with a

peripheric speed about the half of the discharge speed of the vapour.

Among the different fluids the butane or isobutane are chosen having the characteristic thermodynamic propriety to possess in the entropy-temperature diagram the upper limit curve in the range of temperature comprised between 10° C and 100° C with entropy increasing with the temperature, consequently possessing the characteristic that in an adiabatic expansion starting from a saturated and dry vapour or with a high tritation there is obtained after the expansion an overheated or dry vapour, all the inconveniences owing to the humidity of the steam in a turbine being removed. Finally, this fluid, selected by way of example, possesses at the temperature approaching the one of the cold source a pressure of saturated vapour a little higher than the atmospheric pressure so that an easy tightness of the members is allowed as to prevent returns of air into the fluid. As a clearing example the butane has been considered presenting between the end temperatures of 90 and 15° C the thermodynamic proprieties above mentioned. The molecular weight of this fluid is 58, the one of water being 18. The discharge speed in an only

adiabatic expansion between the temperatures mentioned is about 400 metres the second, the one of water steam being 1000, easily allowing the use of one-wheeled action turbine with a simple crown of blades and peripheric speed allowable of only 200 metres the second while in the same case with water steam peripheric speeds would be necessary of about 500 metres the second not allowable according to the present state of technology. The pressure of the butane at 15° C is about 0,8 Kg/cm² higher than the atmospheric pressure while for water steam the absolute pressure is about 0,02 absolute atmosphere. At the end of the expansion the vapours of butane also starting from saturated and damp vapour, but at a high tritation, are in overheated conditions while for the water steam the titration would be rather lower.

The present invention has been illustrated and described in a preferred form of realisation, but it is understood that constructive changes may be practically introduced therein without surpassing the limits of protection of the present industrial patent.

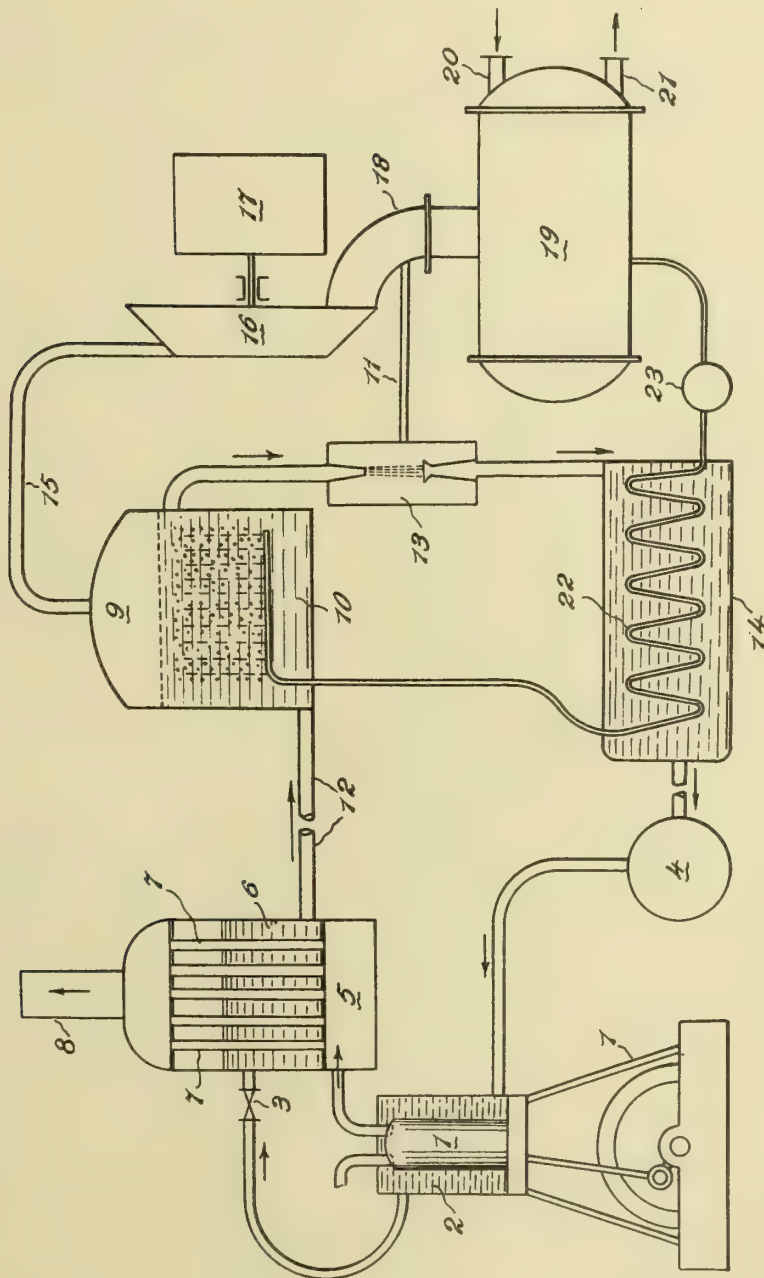
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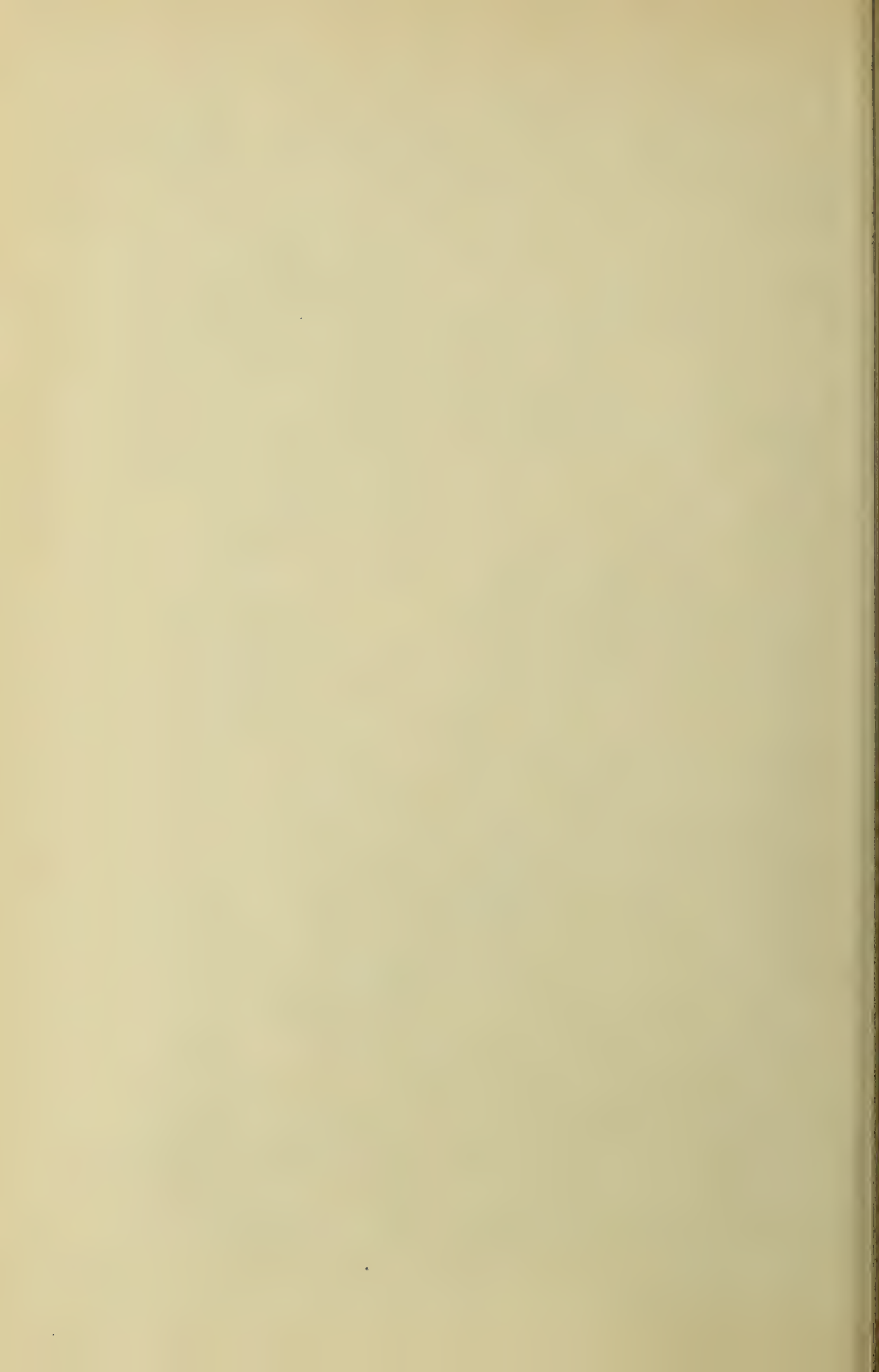
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ALIEN PROPERTY CUSTODIAN

DRIVING DEVICE FOR MACHINES FOR THE
CONTINUOUS AUTOMATIC MASS PRO-
DUCTION OF WORKPIECES

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Application filed March 29, 1940

This invention relates to a driving device for machines serving for the mechanical treatment and handling of workpieces of frequently changing form and/ or dimensions and equipped with tool-controlling cams or cam discs, as turret lathes, automatic and other metal working machines, packing machines, machines for producing incandescent and radio lamps, etc.

The rearrangement of such machines for changing from the duplicate production or handling of one piece to that of another differing from the first in shape and dimensions is expensive and takes up much time, since not only the working tools but also the parts controlling them, such as cams or other curved parts, have to be changed and specially manufactured for each job.

As they must be accurately adapted to the tool motions and are not of uniform type, the cams, etc. had hitherto to be made almost exclusively by hand from rough-machined blanks by highly-skilled toolmakers, so that mechanical production is out of the question. Changing over to a new job consumes therefore much time, and the preparation of the necessary cams, etc. is so expensive that only large-scale production justifies the cost, as otherwise the selling price of the products would be too high.

According to the invention, the drawbacks mentioned are eliminated by installing in the actuating device of each tool holder a cam or cam disc of uniform type and formed according to mathematical laws which is acted upon by a master control arranged outside the machine and governing the various cams in regular periods adapted to the form of the product in such manner that for instance a tool is first rapidly fed up to the work, then slowly advanced for operating upon the work and finally quickly returned to initial position.

The arrangement may be such that the cam or cam disc at each working cycle completes a full revolution and for lifting the tool an Archimedean spiral is used which may be followed by a cylindrical cam portion on which the tool may tarry in end position and then by a returning cam portion for uniform acceleration and deceleration or by a simplified form. When the cam is in initial or zero position the master control throws in a clutch and the cam is first rapidly rotated to feed the tool to the workpiece, then by the automatic action of a second clutch slowly rotated to permit the machining operation until maximum lift is attained at the cylindrical cam piece if any, whereupon at the completion of the

slow rotation the tool with the aid of the returning cam piece is quickly brought back to initial position at which the tool actuating means is stopped by the master control or in some other way, for instance by a contact.

In further accordance with the invention the master control, through the rhythmical impulses given by it, may either perform itself the various machine operations in electric, pneumatic, hydraulic, etc. fashion in connection with mechanical means or merely control the working forces. The master control preferably comprises a rotating roller or disc provided with signal means which are arranged thereon and constructed (punched, screwed on, etc.) in accordance with the intended use of the machine and which, particularly in case of electric contacts, produce current impulses either directly or through a relay, which regulate the power supply to the machine.

The signal means of the master control may be adjustable as required and also fixable at any points of the circumference of the roller or of the surface of the disc. A preferred form of the master control comprises exchangeable templets, as perforated cards, for releasing the impulses, in which case the signal means are not adjustable, since it is advisable to produce a separate perforated card for each job. When the time required for treating each piece is particularly short, the perforations per piece may be so arranged on the templet that two or more workpieces are machined at each revolution of the controlling disc.

A single master control may be coupled with a plurality of machine tools doing the same work.

In a machine according to the invention the principal motion is brought about through the medium of a regulatable source of power or through a variable gear, both of which may be directly or indirectly controlled by the master control. The various tools or operating elements of the machine are moved into operating position by forces governed by the master control, at which the operation itself involving for instance metal cutting is performed by the principal motion of the machine. Furthermore, the machine parts for inserting or advancing and gripping the material to be treated, as bars, etc., are also directed by the master control. The duration of the rotation of the control disc can be regulated at will by auxiliary means preferably of the infinitely variable type.

The end position of the tools is secured by

easily adjustable stops, though the tools are thrust against the stops during the entire working period by the pressure applying force which serves only for advancing the tools whose position is, however, secured through automatically acting indexes. While traveling along the path released by the master control the tools carry out only a slow regulatable forward motion and do already work after the completion of which rapid controlled return follows. The feeds are regulatable according to material and speed.

In still further accordance with the invention the cam effecting the feed of its associated tool together with the respective gears and linkages may be arranged in a gear box and form a self-contained unit. This unit can be installed also in machines intended for various kinds of work, in which the mass production of non-uniform workpieces depends upon a cam or cam disc. Owing to this dependence, the range of application of such machines has been restricted hitherto, since they cannot be used for small-scale production in view of the long tool setting times and the high cost of adjustment.

The invention extends the usability of machines generally, because if a machine per se is suited for doing a certain kind of work differences in form and size can be readily taken care of by producing the right type of master control, for instance a new perforated card, whereupon production may begin. The machines concerned and their products are not only rendered much more economical in this way, but a considerable saving in expensive material, i. e., high-grade steel hitherto required for continually making new cams or cam discs, is effected.

The most characteristic example of the applicability of the invention is furnished by the more or less automatically operating turret and other lathes, and such a machine is therefore chosen to illustrate the invention.

In the accompanying drawings:

Figure 1 is substantially a longitudinal section of the machine without a master control;

Fig. 2, a longitudinal section on an enlarged scale of the actual operating section of the machine;

Fig. 3, a front view of the entire machine in the direction of the arrow shown to the right of Fig. 1;

Fig. 4, a side view of a gear box with the cam gear for tool control;

Fig. 5, a vertical section of the gear box;

Fig. 6, a horizontal section of the gear box;

Fig. 7, a section on the line VII—VII, of Fig. 6;

Fig. 8, a section of the compressed air control for the rapid tool feed;

Figs. 9A—9D show diagrammatically the mode of operation of the control governing the feed and the holding of the work;

Fig. 10 is a view of the master control;

Fig. 11, a plan, partly in section, of Fig. 10;

Fig. 12, a section on the line XII—XII, of Fig. 11;

Fig. 13, a detail view;

Fig. 14 shows the electric connections between the master control and the machine;

Fig. 15 shows in elevation a device for adjusting accurate work lengths; and

Fig. 16 is a plan view of the device shown in Fig. 15.

As shown to the left of Fig. 1, an electromotor 1 which may have pole changing connections and which through a preferably infinitely variable intermediate gear of any type drives a shaft

2 with pulley 2a produces the principal motion of the machine. In the example shown two infinitely variable "Prym" gears 3a, 3b are chosen and so arranged and coupled by a shaft 3 that the gear 3a considerably reduces and the other one 3b has a still greater opposite effect. The gear casings 3e, 3f, disposed oppositely the cones 3c, 3d, are secured on a common slide 4 which can be displaced by a screw 4a to simultaneously regulate gearing up and down. The slide 4 is displaced with the aid of a pair of gears 4b and a chain 4c from a handwheel 4d arranged at a convenient level.

From the pulley 2a, by means of a disc 2b and moderate gearing up, the main spindle 5 is driven whose speed can be read on a tachometer, not shown, which is driven by a pinion 5a, Fig. 2. The hollow main spindle 5 is arranged at 6a and 6b; for holding the material, in this instance a bar, a chuck 7 of known type is used and actuated by a lever 7b by means of a clamping tube 7a, an adapter sleeve 7c and toggles 7d. A nut 7e serves for adjustment.

The lever 7b is connected through a rod 7f with a piston 7g of a control cylinder which can be operated with any suitable pressure medium, as compressed air. In the position shown of the piston 7g the adapter sleeve 7c presses the toggles 7d together while the chuck is pressed on. When the piston 7g is moved to the left, clamping ceases and a feed pipe 8 can be reciprocated by means of a lever 8a and a piston 8b of a second control cylinder provided with a stroke limiting screw 8c. The feed tube 8 is equipped with exchangeable tongs 8d adapted to the diameter of the work concerned and clamping just enough to take the work along to the right.

As shown in Fig. 3, four tool holders 9 are arranged around the main spindle 5 so as to be easily exchangeable and are clamped by means of screws 9f to carriers 9b, 9c, 9d, 9e secured to pins 9a. The cutting angles are adjusted by means of screws 9g. The tools are roughly adjusted by longitudinal displacement with the aid of screws 9h and then tightened by the screws 9i. The tool carriers 9c, 9d to the right are forced up by pressing rods 10a, and the left-hand carriers 9b, 9a are drawn down by draw rods 10b, all the rods 10a, 10b serving also for the fine adjustment of the tools to be described later on.

The rods 10a and 10b are moved by gears which are arranged in boxes 10 as self-contained units and which quickly move the tools at first, then impart a slow working feed to them and finally rapidly return them. Fig. 3 shows the upper tool holders 9b, 9c in zero or initial position and the lower ones 9e, 9d in their end position. The gears are moved by an extension 2c of the main driving shaft 2, Fig. 1, by means of pulleys 2e, 2f. A coolant kept in a container 11 below the shaft 2c is delivered by a pump 11a to the tools, collected after use in a top container 11b and returned through a pipe 11c.

The pulleys 2e, 2f, Fig. 3, are of the double type, as indicated already in Fig. 1. The pulleys 2e on the extension 2c of the main shaft 2 directly drives the two lower pulleys 2f which in turn drive the upper pulleys 2e. To insure convenient and accurate belt adjustment the four pulleys 2f are each eccentrically arranged in a cap 12 which can be turned about its central axis 12a. Fig. 5 shows that the rotation of the pulleys 2f is transmitted through pinions 13a, 13b to a shaft 13 the axis of which coincides with the axis 12a of the cap

12 which can thus be turned within the slots 12b without interfering with the engagement 13a-13b and then be fixed by the screws 12c to permit adjustment of the belt.

The shaft 13 supports within the rim 14a of an infinitely variable "Prym" reducing gear 14 a cone 14b which can be moved to and fro to regulate speed. Displacement of the cone 14b is effected by rotating an eccentric plug 15a of a pin 15 disposed in the front wall of the gear box 10 by means of a handle 15b axially displaceable thereon which after adjustment is secured by a clamp 15c compressing the collars of the pin 15 and of the handle 15b; 15d designates brake linings. The gear 14 drives a shaft 16, Fig. 5, which by means of a four-speed sliding key gear 16c, adjustable through a small gear 16a and a knob 16b, drives a shaft 17 with a worm 17a engaging a worm wheel 17b. Instead of a "Prym" and sliding key gear other regulatable transmission agents may be used.

Each draw rod 10b for the tool holder carriers is articulated by means of a swivel ring 18a to the left end of a lever 18, as shown in Fig. 4, and a bushing 18b provided with fine thread and carrying the ring 18a permits displacement of the point of articulation in upward and downward direction. The bushings 18b serve for effecting the fine adjustment of the carriers 9b, 9c, 9d, 9e.

The lever 18 turns about a pin 18c (right hand end) and near the suspension of the draw rods 10b supports a roll 18d which abuts against a cam 19 which with its recess 19a is shown in broken lines in Figs. 1 and 4. The cam or cam disc 19 is always of uniform shape according to the invention and replaces the known type of cams which had to be specially made for each new job. The cam 19 is fixed on a hollow shaft 19b which supports also a worm wheel 17b loosely disposed thereon and driven by a worm 17a.

The back of the cam 19 is curved like an Archimedean spiral. During rotation of the cam 19 in the direction of the arrow shown in Fig. 4 the rod 10b is drawn down by the depression of the roll 18d of the lever 18 until the roll 18d drops into the recess 19a, whereupon the cam 19 stands still. The subdivision of the stroke of the draw rods 10b or of the pressing rods 10a into a rapid and a slow motion is brought about by varying the rotative speed of the cam 19 for instance by the means described below.

As the worm wheel 17b rides loosely on the hollow shaft 19b, the rotary motion initiated in the gear by means of the double pulley 2f causes at first a rotation of the worm wheel 17b while the shaft 19b and the cam 19 fixed or clamped thereon do not cooperate in this rotation. Inside the shaft 19b a shaft 20, Fig. 6, is provided which supports at its rear end a pinion 20a. To the front end of the shaft 20 a disc 20b is secured by pins, which can be connected in an angularly displaceable manner with a disc 20c in front thereof. In the disc 20c a pawl 20d engages a clearance 19c of the cam support 19d, as shown in Fig. 7, and when the shaft 20 with the pinion 20a rotates in the direction of the arrow shown in Fig. 7, the pawl 20d drives the cam carrier 19d.

The pinion 20a of the shaft 20 is engaged by a rack 21 which through a suitable pressure medium like compressed air can be pushed to the left, as indicated in Fig. 8. The pneumatic piston is controlled by a slide disposed in the casing 21a and subjected to the action of a magnet 22. When the rack 21 while turning the pinion 20a

and the cam 19 moves into its extreme left-hand position which constitutes the unvarying end of its forward stroke, a pin 21b secured thereon strikes a toggle lever 23 which displaces a sleeve 23a and thereby throws in a clutch 17c which couples the worm wheel 17b with a bushing 19e firmly arranged on the shaft 19b. The rack 21 is then rapidly displaced to the left by the pneumatic piston, so that the pinion shaft 20 rotates quickly and drives the hollow shaft 19d and the cam 19 by means of the pawl 20d. This rapid rotation of the cam 19 effects quick lowering of the draw rod 10b and thereby rapid feed of the tool concerned up to the workpiece.

The coupling of the worm wheel 17b with the hollow shaft 19b permits, moreover, the commencement of the slow feed motion for machining the workpiece. When the clutch 17c, 19e is thrown in, the worm gear 17a, 17b slowly turns the cam 19 until the latter occupies again its initial position.

During the return of the cam 19 into zero position the current for the magnet 22 is automatically cut off. A switch 24 shown to the left in Fig. 5 extends with its movable head 24a, Fig. 6, up to the circumference of the coupling bushing 19e and is normally pressed back by the latter (switch closed). The circumference of the bushing 19e has, however, a groove into which the head or knob 24a of the switch 24 drops when the cam 19 has completed its rotation (switch open). When the current for the magnet 22 is switched off, the rack 21, in response to the action of a spring 21e, Fig. 8, moves again to the right, the pin 21b releases the toggle lever 23 and the coupling of the worm wheel 17b with the hollow shaft 19b is tripped by a spring 23b engaging the toggle lever 23. The cam 19 stands then still, and a working cycle is completed.

As the start of the slow working movement changes according to the nature of the different products to be treated, the ratio of rapid motion involving the guiding of the tools to the workpiece to slow feed motion involving the machining of the workpiece must be adjustable, since it is intended to have the cam 19 complete a revolution for each operation. The sum of "rapid motion+working motion" must always be the same.

The ratio of rapid motion to slow feed motion can be varied by rotating the two discs 20b and 20c, Fig. 6, relative to one another. For this purpose, the clamping screws 20e are loosened and the front disc 20b is turned by a wrench applied to a square 20f of the pinion shaft 20. The two discs 20b, 20c have a bevelled circumference bearing graduation marks corresponding to millimeters of the tool lift in view of the prevailing gearing. When they have been rotated relative to each other the discs 20b, 20c are clamped together again by the screws 20e.

In order to permit variability of the quick motion the piston rod and rack 21 must be able to travel a path differing in length. As its left end position is unvarying, the starting point to the right must be changeable, and it is further necessary that at the start the pawl 20d of the disc 20c engages the recess 19c of the cam carrier 19d. By the relative adjustment of the discs 20b, 20c relative to each other these conditions are met simultaneously.

In view of the necessity of providing for variability of the quick motion the return stroke of the rack 21 occurring at the completion of each slow feed motion in right-hand direction must

position shown and the stop 46—46f into operating position.

The bar to be machined is then pushed by the feed tube 8 through the adapter sleeve 7c against the stop bolt 46f which in case of any further bar pressure due to excessive feed does not yield, since the crank pin 47e is in dead center position. After completion of the feed operation and of the subsequent fixing (pistons 8b and 7g, Fig. 2) the magnet 47 becomes currentless and the springs 49 pull back the rack 47b to the right. The stop 46 moves back from the working point (tool holder carriers 9, etc.), so that the new workpiece is freely exposed for machining.

The control of the electric impulses for the magnet 47 can, according to the invention, be either assigned to the master control or with the aid of correspondingly arranged contacts inserted in the sequence of operation involving the feed of the material and its clamping.

The invention is not restricted to the constructional embodiment shown. The terms "master control" and "cam" are to be interpreted in the broadest sense. The term "master control" is intended to cover any member capable of bringing about control effects for the initiation or release of motions or working operations which may be carried out electrically, mechanically, pneumatically or hydraulically. Instead of cams or cam discs, the members controlled by the master control may comprise also cranks, spindles or other machine elements. The number of tools or tool holders subjected to the influence of the master control is optional. The master control may serve also for influencing the speed and direction of rotation of the main drive.

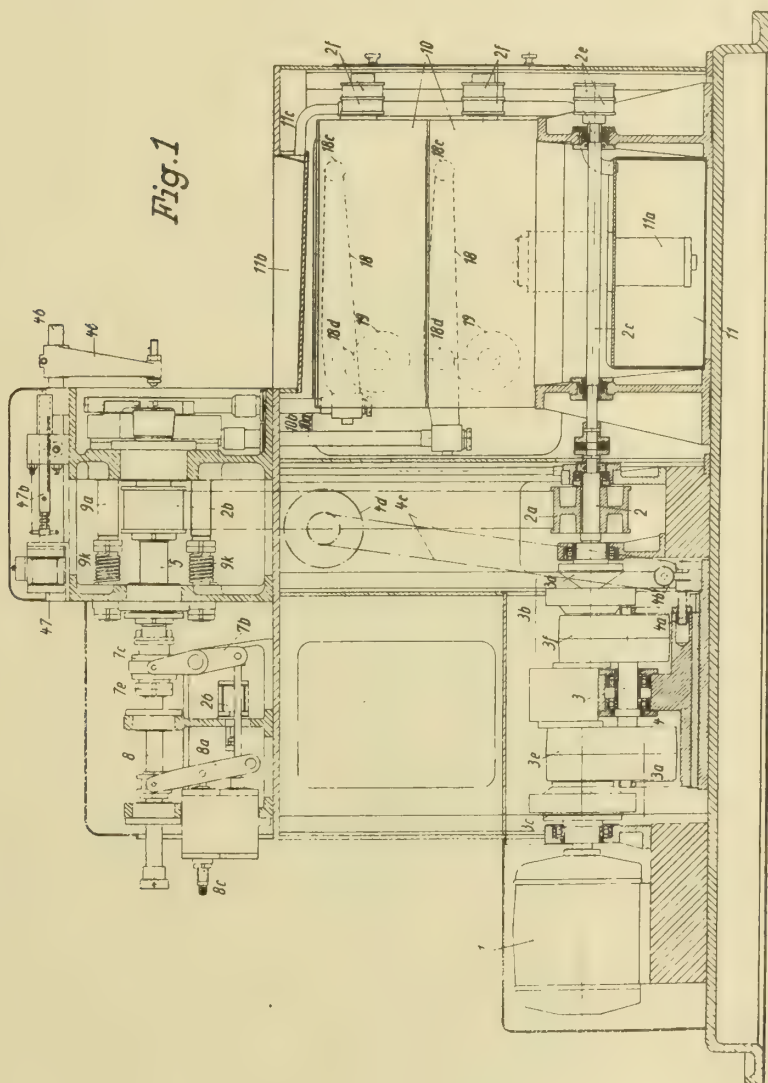
GERHARD REINERS.

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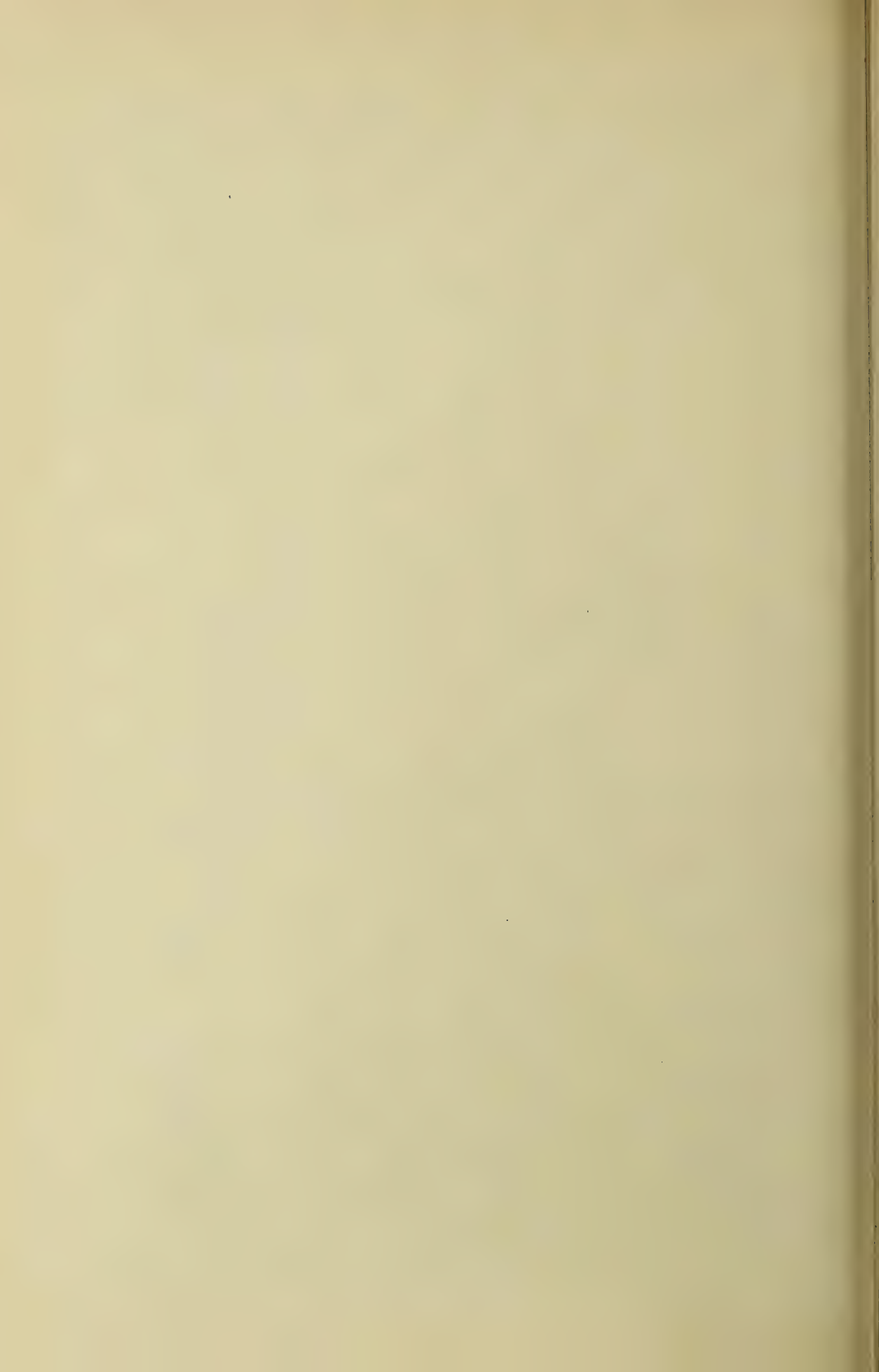
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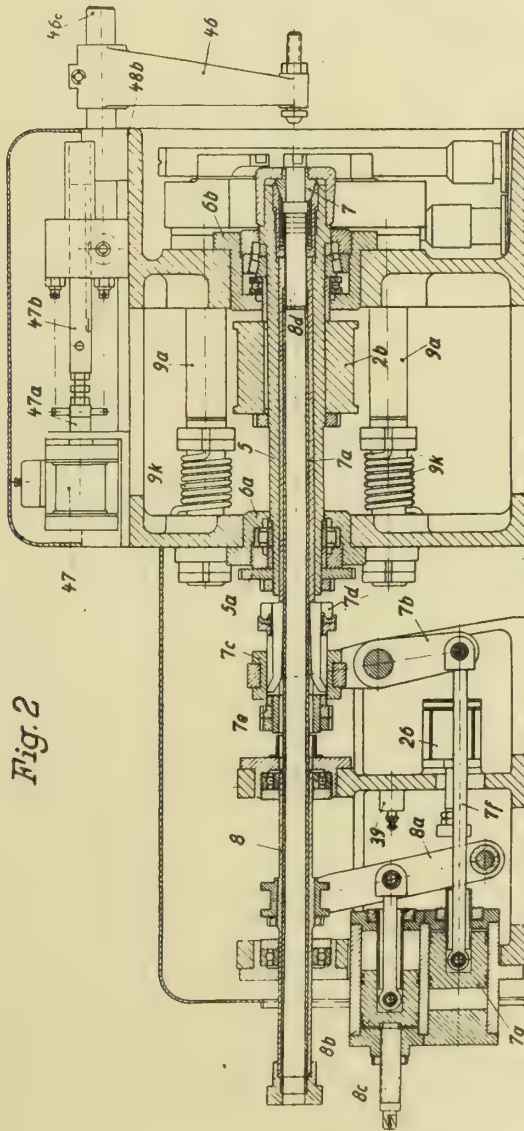


Fig. 2

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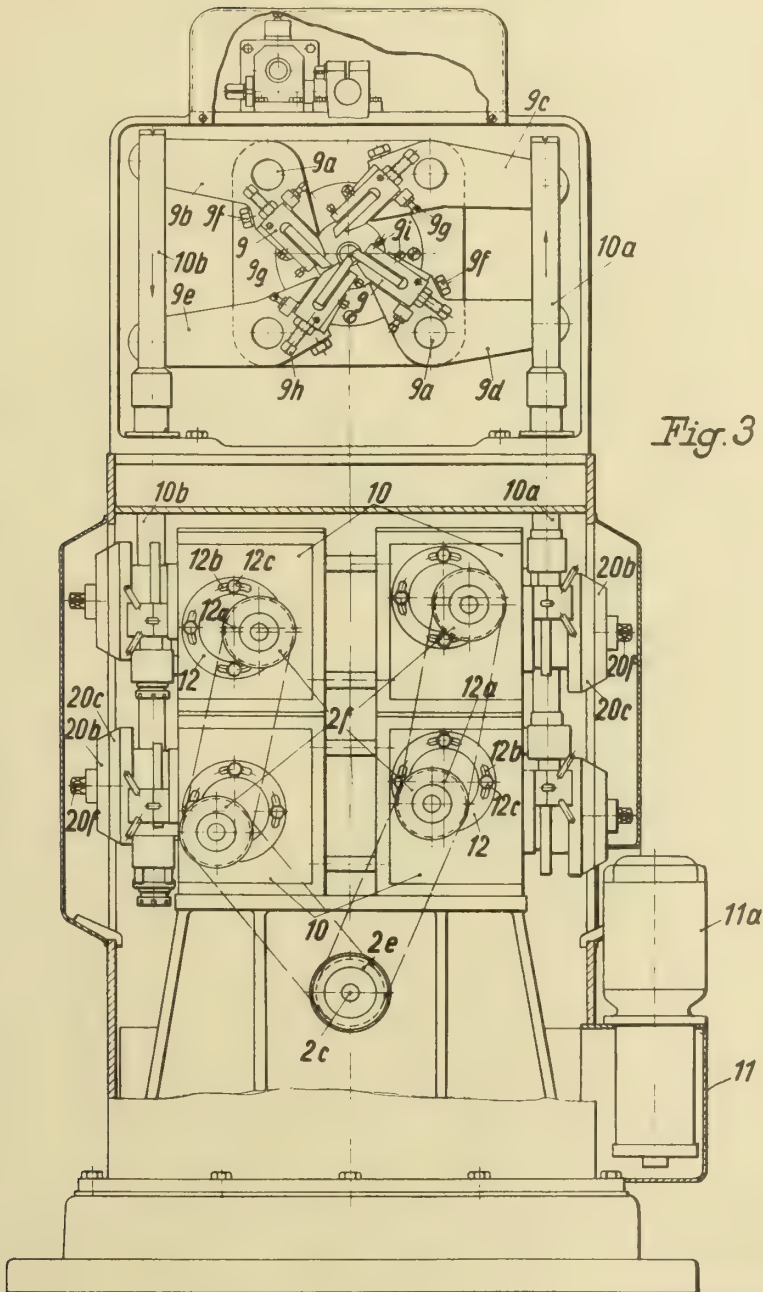


Fig. 3

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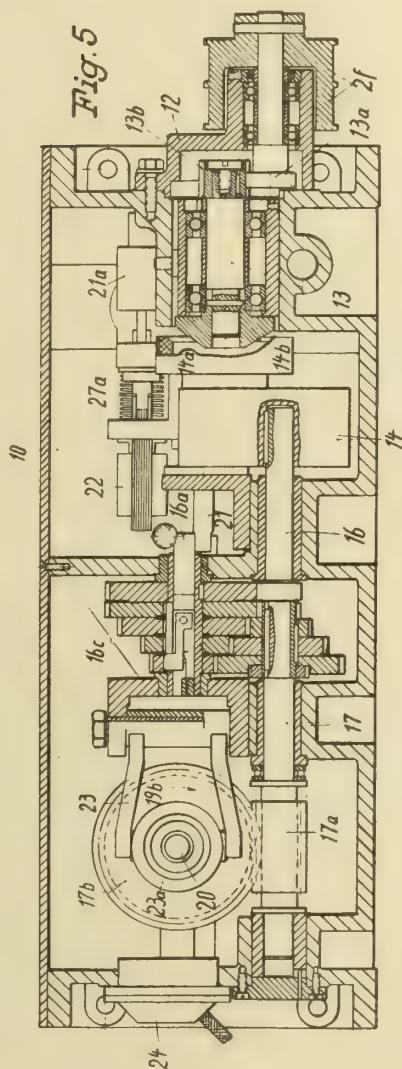
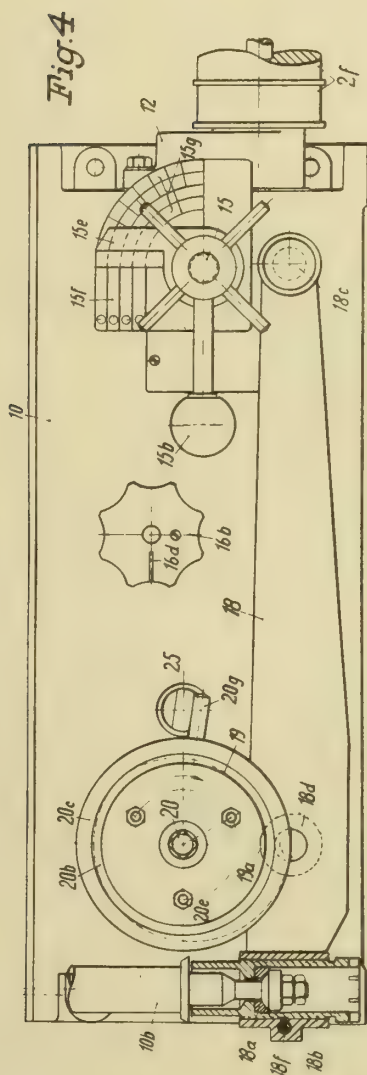
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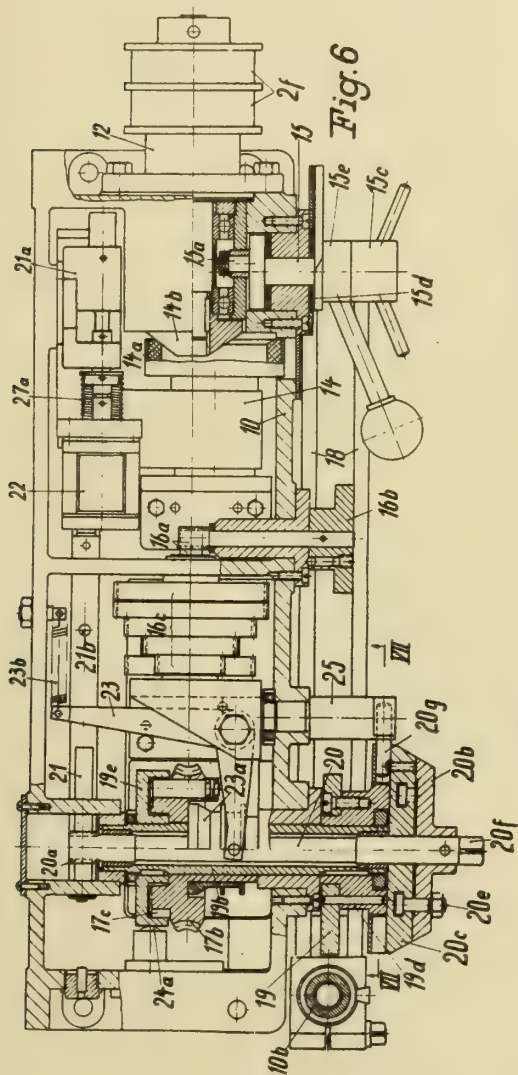


Fig. 6

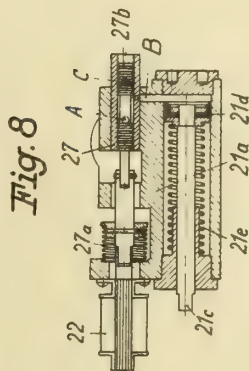


Fig. 8

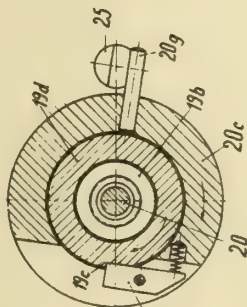


Fig. 7

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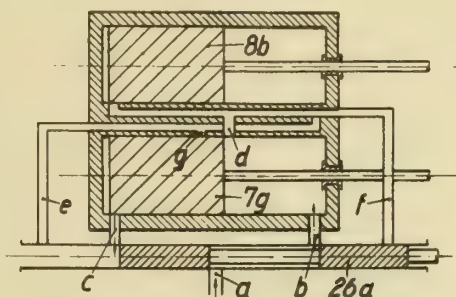


Fig. 9

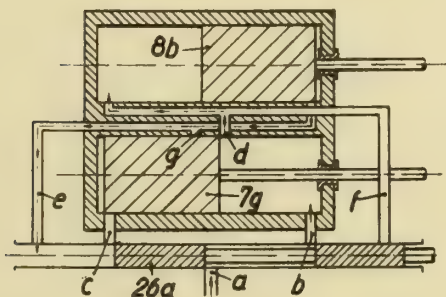


Fig. 9A

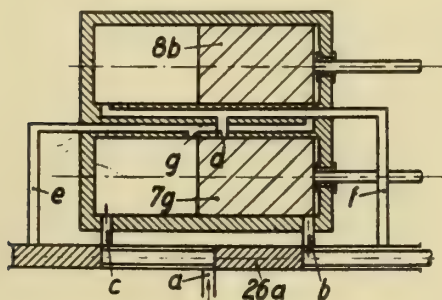


Fig. 9B

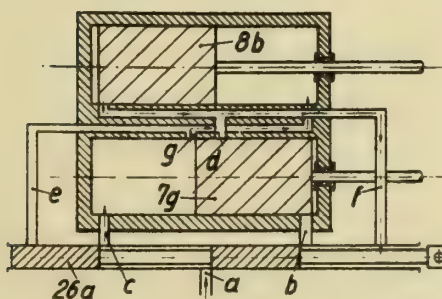


Fig. 9C

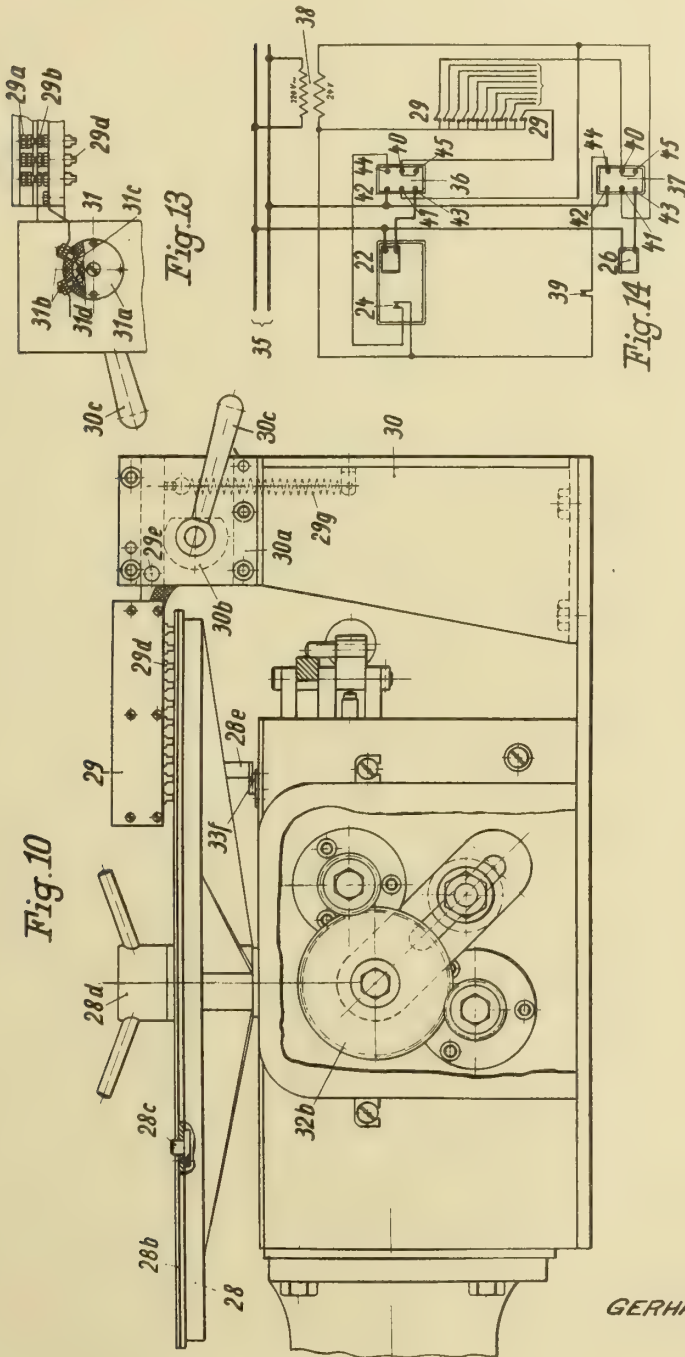
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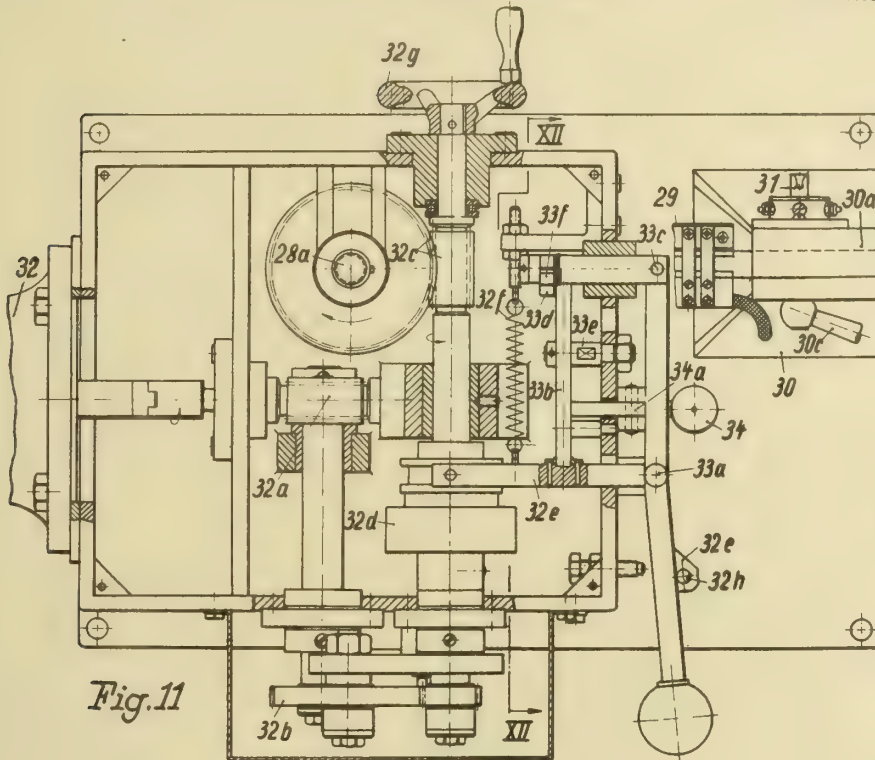


Fig. 11

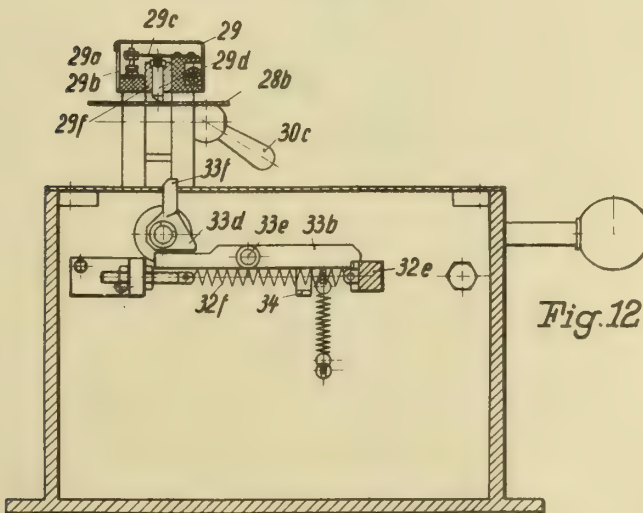


Fig. 12

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Fig. 15

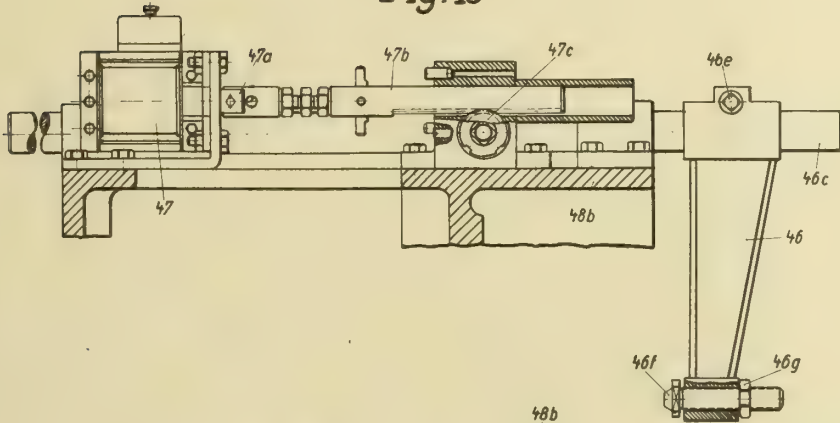
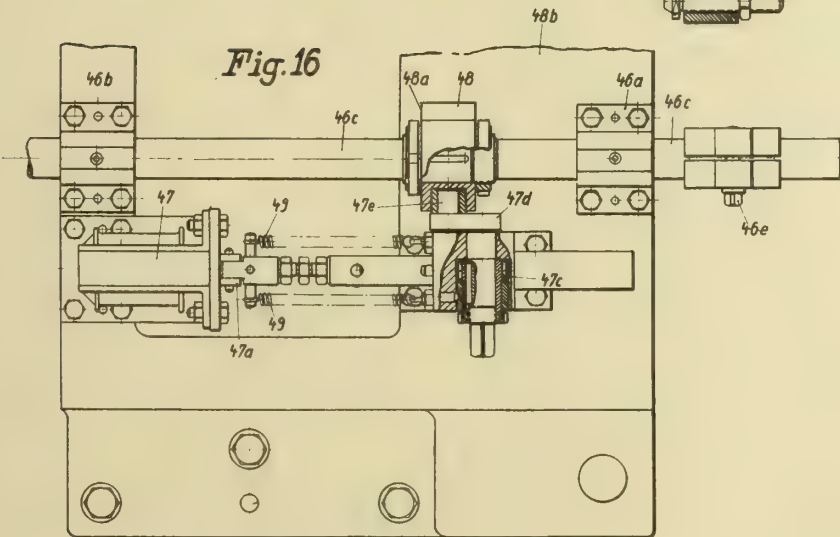


Fig. 16



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ALIEN PROPERTY CUSTODIAN

TEMPERATURE RESPONSIVE CONTROL MECHANISM, ESPECIALLY FOR REFRIGERATING APPARATUS

Peter Pfaff, Berlin-Siemensstadt, and Hanns Benkert, Berlin-Charlottenburg 9, Germany; vested in the Alien Property Custodian

Application filed March 30, 1940

The present invention relates to temperature-responsive control mechanism, especially for refrigerating apparatus.

For operating refrigerating apparatus in response to changes in temperature and for thus controlling the amount of energy supplied, for example, to the motor-compressor unit of a refrigerator, it has been customary to employ thermostatic devices consisting of a closed gas-filled container the contents of which, responsive to changes in temperature of a part of the refrigerating apparatus, are subjected to changes in pressure, thus effecting the respective control operations. These types of thermostatic devices, however, have the disadvantage of easily inclining to leak and of then controlling the temperature of the refrigerator incorrectly.

For ensuring proper operation, these thermostats are usually mounted so that the heat-responsive elements thereof are in direct heat exchanging contact with the evaporator of the refrigerating apparatus resulting in relatively large variations in temperature between the times of turning on and off the supply of energy of the apparatus. Such arrangement of the thermostat, however, requires additional adjusting means for controlling the apparatus also in accordance with the varying temperature of the outside atmosphere. These adjusting means are, however, of relatively complicated design and increase the cost of the control mechanism of the refrigerator considerably.

It is the object of the present invention to provide a temperature-responsive control mechanism for refrigerating apparatus which overcomes the disadvantages of the prior art as described above and forms a simple, inexpensive means for accurately controlling the operation of household refrigerators.

A feature of the invention resides in a temperature-responsive control mechanism, especially for household refrigerators, including a contact thermometer for controlling the operation of a relay in accordance with the changes in temperature of a certain portion of the refrigerator, which relay, in turn, is used for switching on and off the supply of energy for operating the refrigerating apparatus.

A complementary feature of the invention is a device for disconnecting the contact thermometer or rendering the same inactive, and for connecting the control relay directly to the source of energy so that the refrigerating apparatus may be controlled either automatically in response to the operation of the contact thermometer to main-

tain a certain temperature in the cooling chamber, or manually by connecting the refrigerating apparatus continuously to the source of energy for freezing any kind of food products or obtaining ice cubes within a short time.

In its simplest form, the invention consists in a thermometer connected to a source of current and having a single fixed contact for controlling the operation of the relay in accordance with a certain temperature, and a simple switch connected to the thermometer for bridging, when in closed position, the contact thermometer to connect the control relay directly to the source of current. Since the cooling chamber of a refrigerator, and especially a household refrigerator is usually maintained at a certain temperature determined by experience, for example $+6^{\circ}\text{C}$, it is only necessary according to the invention to secure the single controlling contact at a point of the thermometer corresponding to such temperature. It has been found advisable to mount the thermometer so as to indicate the temperature of the cooling chamber and not to be in direct heat exchanging contact with the evaporator.

Further objects, features and advantages of the invention will appear from the following detailed description and the accompanying drawing, in which

Fig. 1 is a diagrammatic showing of one embodiment of the invention,

Fig. 2 discloses the manner of mounting the thermometer according to Fig. 1 within a refrigerator casing, and

Fig. 3 is a diagrammatic showing of a modification of the invention.

As shown in the drawing, the invention may, for example, be applied to a refrigerator provided with a compressor driven by an electromotor. The current is supplied by the mains 1 and 2 through a main switch 3 to the winding 4 of the motor for driving the compressor (not shown). A control relay 5 having a winding 6 automatically opens or closes the circuit of the motor 4 in accordance with the temperature of a portion of the refrigerator. For this purpose, a thermometer 7 having a pair of fixed contacts 8 and 9 is provided in the circuit of the relay winding 6 in the manner shown in Fig. 1. Thus, as soon as the mercury column 10 of the thermometer 7 rises sufficiently to connect the contacts 8 and 9, the circuit of the relay winding 6 as well as the contacts of the relay 5 are closed to start the motor 4. The contact 8 is preferably fixed at a point of the thermometer corresponding to the

desired temperature of the cooling chamber of the refrigerator.

Although the cooling chamber of the refrigerator will generally be maintained automatically at a certain temperature by the controlling action of the contact thermometer, a manual control may sometimes be desirable for obtaining a higher or lower temperature for a limited time, for example, for freezing food products or for obtaining ice cubes within a short time. For this purpose, the invention provides a manually operated switch 11 which, when in closed position, bridges the contacts 8 and 9 of the thermometer so that the motor 4 is driven continuously until the switch is open when the refrigerator is again controlled automatically by the contact thermometer 7.

As indicated in Fig. 2, the contact thermometer 7 is preferably mounted in the cooling chamber of the refrigerator, for example, on the rear inner wall thereof, so as to indicate the temperature of the air therein. It may be provided with the temperature scale facing the door of the refrigerator, thus permitting a reading of the temperature of the cooling chamber regardless of whether the switch 11 is opened or closed. It may also be desirable to operate the contact thermometer 7 and the relay 6 with a current lower than that supplied by the mains 1 and 2. This may be easily achieved by providing a resistance 13 in the manner shown in Fig. 1 and of a size corresponding to the resistance of the relay winding 6.

If it is desirable that the automatic controlling action of the contact thermometer be adjustable to permit different predetermined temperatures to be maintained at different times in the cooling chamber of the refrigerator, the thermometer may be provided with two or more controlling

contacts and a suitable switch or the like for selecting one or the other contact, or for disconnecting the thermometer entirely from the relay circuit if the refrigerator is to operate continuously, as described relative to Fig. 1.

According to this embodiment of the invention as shown in Fig. 3, the contact thermometer 7' may, for example, be provided with five stationary contacts 14 to 18, the contact 14 forming the lead-in contact and contacts 15, 16, 17 and 18 the temperature controlling contacts corresponding, for example, to the temperatures of 2°, 4°, 6° and 8°C, respectively. The contacts 15 to 18 are connected to the corresponding contacts of a single manually operated switch 19, the fifth contact of which is connected to the lead-in contact 14 of the thermometer.

The operation of the device is similar to that described relative to Fig. 1. If the switch 19 is placed, for example, in the position indicated in Fig. 3, the cooling chamber is automatically maintained at a temperature of 6°C. As soon as the mercury column 10 connects the lead-in contact 14 with the control contact 17, the circuit of the relay 6 is closed causing a closing of the relay contacts 5 so that the motor 4 starts to operate. For quick-freezing purposes, the switch 19 is placed in the position shown in dotted lines, thus bridging the control contacts 15 to 18 and maintaining the relay 6 continuously energized.

Although the invention has been described with particular reference to refrigerators operated by a motor-compressor unit, obviously it may also be applied to other types of refrigerators and especially those operated by continuous absorption in which case the winding 4 may be substituted by a heating coil or the like.

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TEMPERATURE-RESPONSIVE CONTROL MECHANISM,
ESPECIALLY FOR REFRIGERATING APPARATUS
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Fig. 1

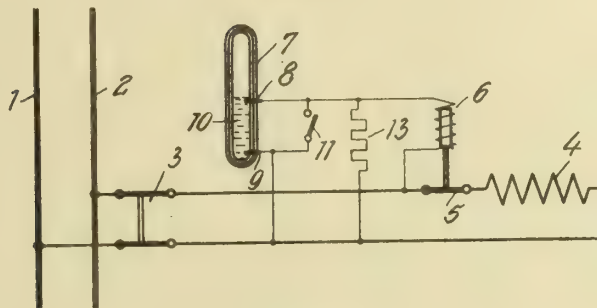


Fig. 2

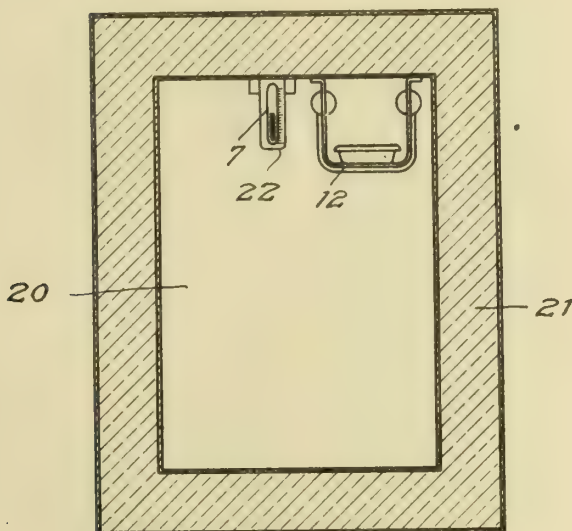
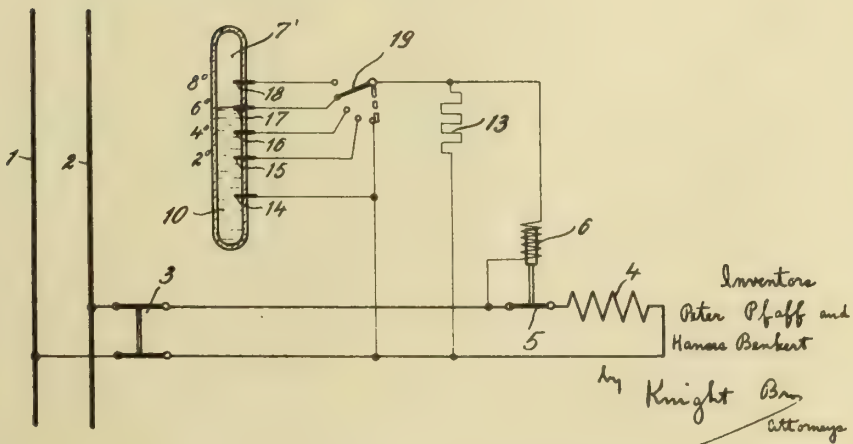


Fig. 3



ALIEN PROPERTY CUSTODIAN

PARQUET SYSTEM

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Application filed April 1, 1940

The invention refers to strips for parquet or inlaid floors connected crosswise by disconnected grooves on their lateral as well as end faces, which are arranged in such a manner that, with a comparatively low height, in other words with a comparatively limited thickness of the various strips, a comparatively high thickness for wearing results, without causing, as a result of the comparatively short distance of the joint-grooves from the lower edge of a strip, the danger of the lower side portion of the grooves breaking off. In comparison with the inlaid floor strip commonly used the strip according to the invention having the same thickness of wearing surface may be manufactured with a total thickness of one third less, which results in a considerable saving of material. In other words, this invention deals with a strip for inlaid floors with part-way cross joints, which is specially characterized in that the thickness of the upper side portion of the grooves which is formed by several grooves in the shape of a circular arc separated by intermediate material, is several times that of the lower side portion of the grooves and that the intermediate material between the successive grooves is only wide enough to insure a sufficiently large surface of interengagements between grooves and projections engaging into same, to keep the lower side portions from breaking off.

The strips for inlaid floors in use at the present time, usually in a thickness of 16 mms are provided with a through-going cut groove in a distance of about 7 mms from the upper edge of the strip. Joining or other strips will fit into this cut groove. The wearing thickness in this case amounts to less than 7 mms. To place the through-going groove at the lower edge of the strip is impossible on account of the impending danger of the lower side portions of the grooves breaking off.

However, the joints of the strips according to the invention are arranged in such a manner that the connecting grooves provided for on the end and lateral faces do not go all the way through, but are arranged with spaces between them. The connecting grooves are therefore individual cuts separated from each other by the intermediate material. In spite of the comparatively short distance of the grooves from the lower edge of the strip the lower side portion of the groove will not break off because sufficient material remains between the various rectangular holes.

Compared to the floor strips with grooves and keys running all the way which are commonly used, the following advantages are obtained: If the thickness of the material is the same a greater resistance against wear is at disposal; or, the thickness of the wearing surface being the same, the strips may be made of a considerably thinner material. The results are the following: The thickness of the flooring in general is decreased

which means, keeping the originally planned height of the rooms, a reduction of the total height of the building, if a building of several stories was planned. The decreased weight of the flooring permits a lighter construction of the ceiling supports and above all a saving of wood on the inlaid floor proper. Contrary to the commonly used construction method of grooves and keys, which may cause the lower side portion of the grooves to break off and also cause the keys to break in the direction of the grain of the wood, because the grooves and keys are forced to bend as they run in the same direction as the natural grain of the wood, the joints in accordance with the invention follow in no case the natural grain of the wood. Therefore, if joints according to the invention are used, the lower side portions of the strips and the keys cannot break in the direction of the grain. Hereby and also by leaving a certain amount of material at the edges of the strips between the grooves and by using short appropriately shaped keys—made of wood or a composition material on a base of phenol, urea, casein or wood, with the joints according to the invention, a bending-, impact-, notching-, tensile- and compressive strength of the inlaid floor joints is attained, that the strips may be placed on the timberwork without using a false bottom or other supporting frames. This may also be done with the patterns deviating from the so-called boat flooring and without having the end faces of the strips rest on supporting members or resilient supports or be fastened to same. This decreases the height of the flooring in general and with buildings of several stories the total height of the buildings (namely by the height of the false bottom) and causes a saving of material (namely the material used for the false floors).

The invention will be better understood by reference to the following detailed description in connection with the accompanying drawing showing by way of example and purely schematically some embodiments of the invention and in which:

Fig. 1 is a perspective view showing a strip of inlaid floor having the invention applied thereto.

Fig. 2 is a section on line II—II of Fig. 3.

Fig. 3 is a side elevation of a similar strip as

Fig. 1.

Fig. 4 is a section on line IV—IV of Fig. 5, showing a modification.

Fig. 5 is a side elevation of the modification shown in Fig. 4.

Fig. 6 is a plan view of parquet or inlaid floor, with the wooden strips partly removed to show the substructure.

Fig. 7 is a section on line VII—VII of Fig. 6.

Fig. 8 is a plan view, partly in section, showing the connection between adjacent strips of varying width and

Fig. 9 is an enlarged fragmentary section illustrating a detail.

Similar reference numerals denote similar parts in the different views.

The strips for the inlaid floor 1, made entirely of hard-wood (oak) or of a base plate of soft wood and a cover of veneer or such of finer wood, are provided with curved recesses or grooves 2 instead of longitudinal grooves on their lateral faces (see Fig. 1). As will be seen from Figs. 2 and 4 these recesses or grooves 2 may be made by a vertical cutter producing circular segment shaped recesses. The grooves 2 are arranged contiguously with varying space between them. The keys 3 fitting in the grooves 2 are in the shape of elliptical paraboloids, the parabolae of same being of the same size and shape as the circular segments of the grooves 2. The corners of the keys 3 may be cut off, as demonstrated on two keys of Fig. 4. These keys 3 join several of the strips 1 in an almost jointless integral. The grooves 2 which may be of any desired shape, square, oval or elliptical, but for reasons of efficacy may taper down, are comparatively narrow. Practically a height of 2 mms is sufficient. They are placed in a short distance from the lower edge of the strip 1. A distance of from 3 to 4 mms from the lower edge will generally be sufficient. Nevertheless it is practically impossible for the portion between the groove 2 and the lower edge of the strip 1 to break off, even if submitted to heavy stress, taking of course for granted that the use is normal, because, as can be seen from the plan and longitudinal views, there is enough solid original material between the various grooves 2, which increases parabolically from the farthest points of two neighbouring grooves 2 and therefore does not follow the direction of the grain. If the grooves 2 are not made too large, breakage is impossible. Also the keys 3 of elliptical shape have at no point the same direction as the grain of the wood and under normal circumstances cannot break. The notching strength of the elliptical keys 3 is the same, as if the keys were rectangular and extended the whole length of the strip. In place of wood any other suitable material, such as, a composition or laminated material or press material of wood, cellulose, phenol or a similar product may be used for the keys, as these synthetic materials are considered to have better properties than wood. Therefore by using keys made of a composition or synthetic material, the strength of the joints may be materially increased.

Taking 6 mms as the total of the distance between the groove 2 and the lower edge of the strip 1 and for the height of the grooves 2, which is practically entirely sufficient, and 12 mms as the distance from the groove 2 to the upper edge of the strip 1, a material thickness of the entire floor strip of 18 mms results. Of this thickness almost 12 mm can be considered as available for wear, but the joint in its entirety does not lose its solidity. Experience has shown that the floor strips with grooves and keys from end to end must have a thickness of 24 mms if a wearing thickness of 12 mms is expected, because for the joint including the lower side portion of the strip a height of at least 12 mms is required. With the exception of the so-called boat flooring these floor strips with grooves and keys from end to end must be, as is known from experience, laid on a false bottom. This false bottom must have a thickness of from 12 to 24 mms, if the same solidity as that of a joint constructed according

to the invention is desired. Once the upper side portion of the strip with grooves and keys from end to end is worn to almost the upper edge of the longitudinal groove, the key and the lower portion of the strip together do not have sufficient strength. With a floor joint of this kind the false bottom is required to carry the main load. By joining the strips according to the invention by disconnected grooves 2 and correspondingly short keys 3, preferably of parabolical-elliptical shape, there remains enough original material between the grooves 2 and also the keys 3 to guarantee under the worst wearing conditions sufficient compressive bending- and impact bending strength, even if the strip has been worn to almost the upper edge of the groove 2. A false bottom or any other base underneath the joints according to the invention is therefore not required. Besides that, by joining the strips according to the invention, a multitude of individual pressure carrying centres is created, which as a whole increases the solidity of the floor. In case an individual key 3 or a groove 2 should be destroyed by abnormal happenings, the joint as a whole cannot be loosened, as would happen to a joint with grooves and keys from end to end. The multitude of such pressure carrying centres gives to the joint in its entirety a closer, almost homogeneous connection, which assures greater strength.

Referring now to Figs. 6 and 7, it will be seen that a false bottom is not being used, the various floor strips resting directly on the mainbeam on one side and on the other side on transverse braces 6 which again rest on blocks 7 fastened to the main beam. To make a complete picture, the intermediate ceiling 8 with beam braces 9, fill 10, ceiling cober 11 and plaster 12 are shown in Figs. 6 and 7.

Fig. 8 explains figuratively the employment of floor strips 1 of a different width. The cut grooves 2 of the strips of a different width do not lie across from each other, but are staggered. This makes it possible to fit the keys 3 into the cut grooves 2 in spite of the different width of the floor strips 1. This however is only possible due to the elliptical shape of the keys 3, according to the invention. The keys 3 will line up corresponding to the counter-set or staggered position of the grooves 2 contacting each other. Fig. 9 shows schematically on an enlarged scale how a key 3 lines up.

The cut grooves 2 and the keys 3 may be arranged, as is shown in Figs. 2 and 3, on the end faces 4 of the strips in such a manner that a through-going groove of the height and depth of a cut groove 2 is provided which makes it possible that either the front or the lateral faces of the adjacent strips may be joined to the end faces 4 of the strips 1 by placing the keys 3 wherever they are required. It is also possible, as is shown in Figs. 4 and 5, to provide the front faces 4 of the strips 1 with a cut groove 2 and a key 3 each of the same kind as are provided on the lateral faces of the strips 1.

The method and apparatus of the present invention have been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described and illustrated in the drawing.

LORENZ MALZER.

Fig. 1.

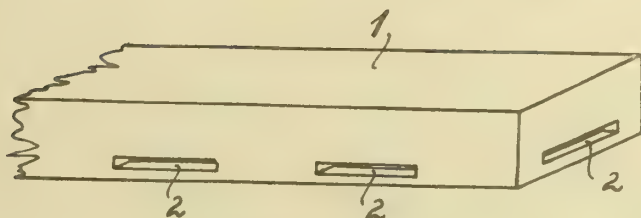


Fig. 2.

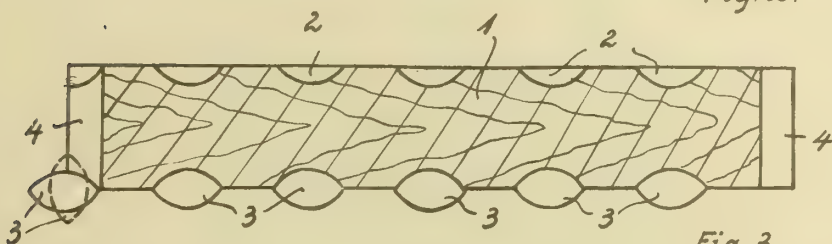


Fig. 3.

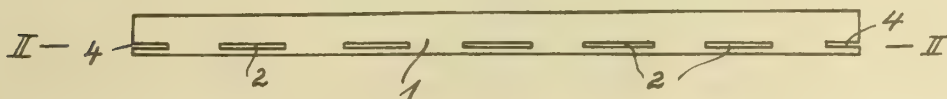


Fig. 4.

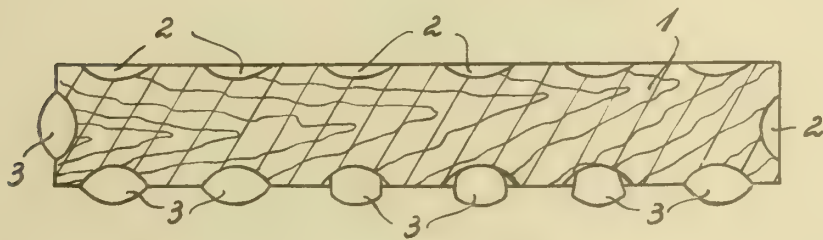
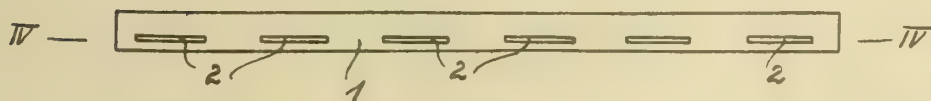


Fig. 5.



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Filed April 1, 1940

Serial No.
327,119
2 Sheets-Sheet 2

Fig. 6.

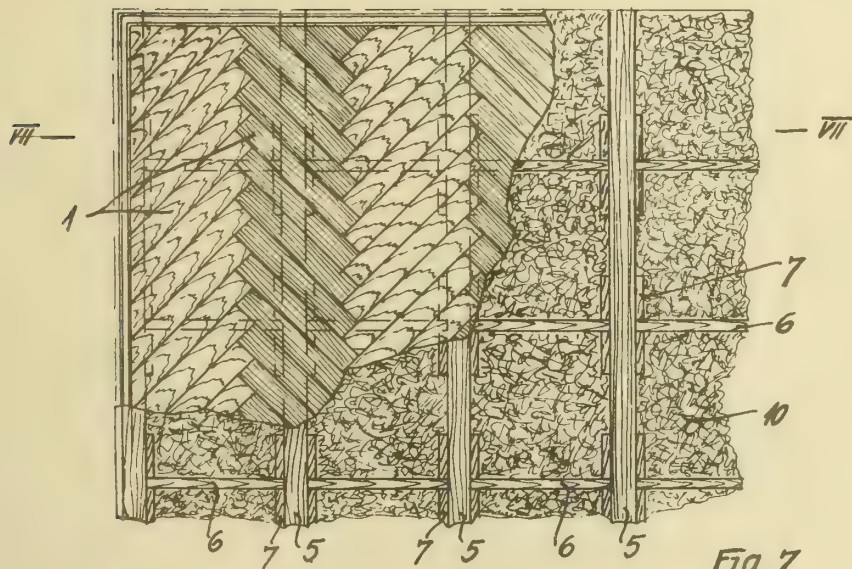


Fig. 7.

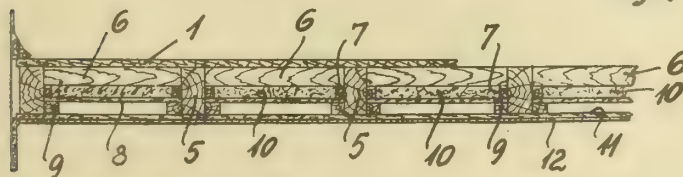


Fig. 8.

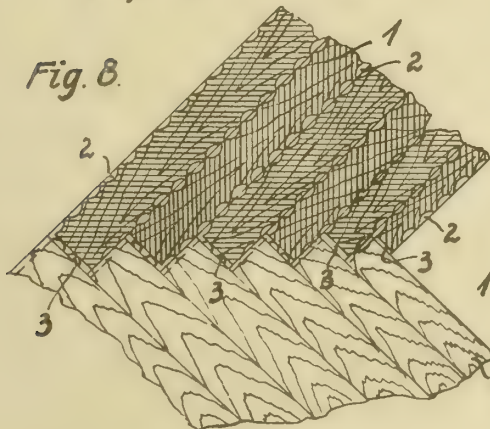
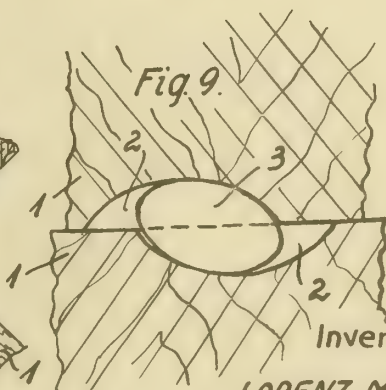


Fig. 9.



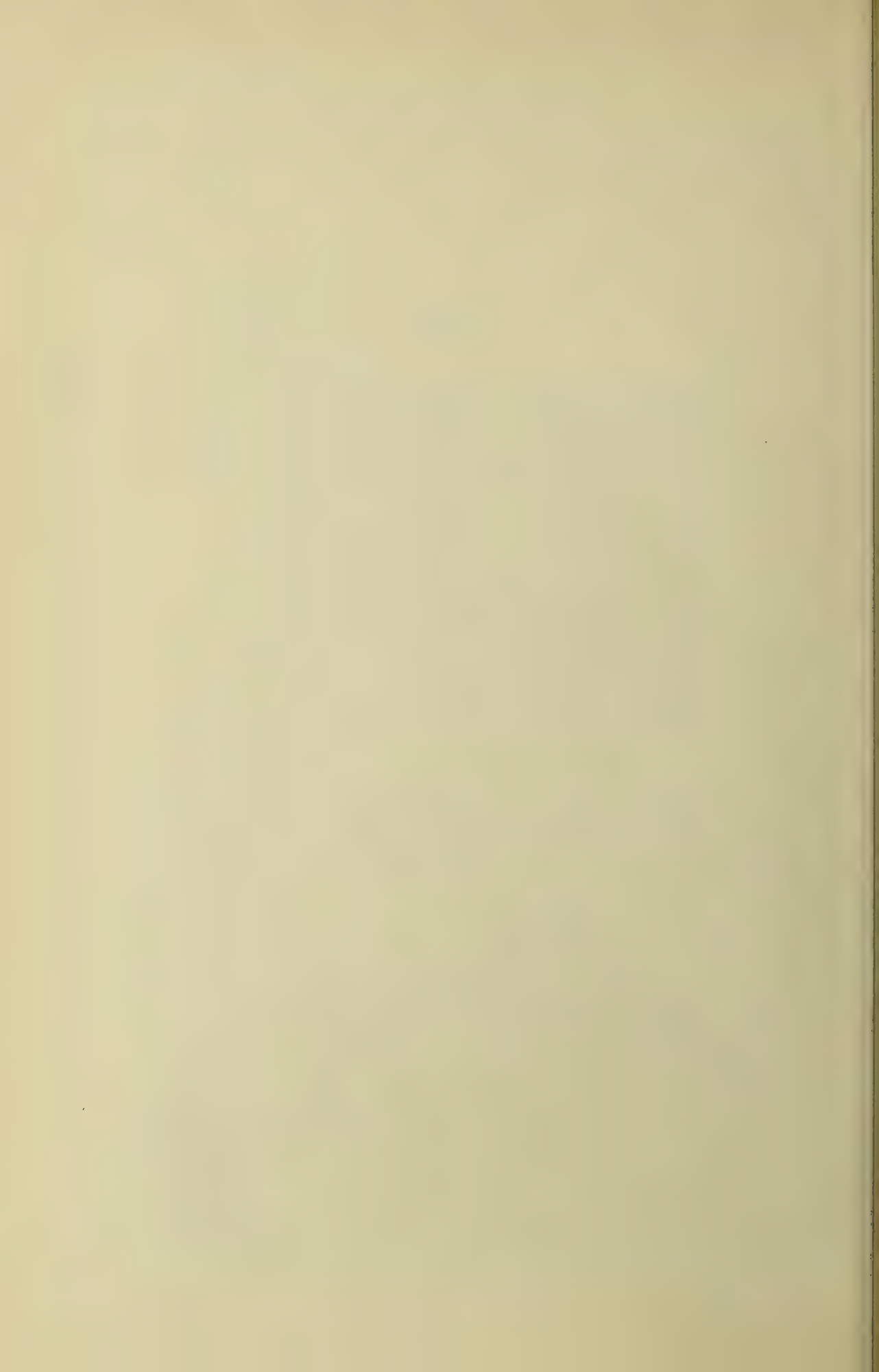
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ALIEN PROPERTY CUSTODIAN

FLEXIBLE STRIP FOR PRODUCING SLIDE CLASP FASTENERS

Alfred Boenecke, Berlin-Schoneberg, Germany;
vested in the Alien Property Custodian

Application filed April 2, 1940

The present invention relates to slide fasteners and particularly to the shape of a strip of flexible material from which slide clasp fastener elements may be formed integral with the stringers for such fastener elements. This application is a division of my copending application Serial No. 254,965, filed February 6, 1939.

A slide clasp fastener of the usual type includes two stringers composed of fabric and the fastener elements which are separately secured to the stringers and the slide fastener elements usually consist of metal or other similar materials. In the production of slide clasp fasteners of this type it is necessary to attach the fastener elements to the stringers and apparatus has been provided to apply the metallic fastener elements in one continuous operation.

An object of the present invention is to provide a strip of flexible material from which the fastener elements together with the stringers may be simultaneously formed.

Other and further features and objects of the invention will be apparent from a consideration of the accompanying drawing and the following description wherein an exemplary embodiment of the invention is disclosed.

In the drawing:

Fig. 1 is a perspective view of a strip of flexible material from which the fastener elements and stringers may be formed.

Fig. 2 is a plan view of the strip shown in Fig. 1 illustrating the manner in which the fastener elements are formed from parts of the strip.

Fig. 3 is a plan view partly in section illustrating the manner in which the fastener elements may be interlocked.

Referring to the drawing there is shown in Fig. 1 a strip of flexible material shaped in such a manner as to provide the requisite characteristics to the finished fastener elements and the stringers. The parts of the strip shown in Fig. 1 at 1 are designed to provide the stringers for the fastener elements. The strip further includes hollow beads or enlargements 2 each of which is provided with a longitudinal passage 3 as shown in Fig. 1. The hollow enlarged portions 2 are spaced with respect to each other so as to leave between these beads a strip portion 4 having a slightly greater thickness than the stringer portions 1 of the strip. The central portion 4 however is not as thick as the bead portions 2.

The strip from which the fastener elements is produced may be formed of any suitable material such as synthetic resins, ebonate or suitably prepared rubber compounds or the like.

The strip may be preformed of any suitable flexible material for example by extrusion in dimensions and shape so as to provide the desired shape and appearance to the finished fastener elements.

The two cooperating parts of the slide fastener or the two appertaining series of fastener elements are produced simultaneously with the stringers from the strip shown in Fig. 1. The strip is initially of a double width and the two cooperating parts of the fastener are simultaneously formed from the strip which is thereafter severed along the groove 5 to form the two appertaining parts of the fastener.

In producing the fastener elements the strip shown in Fig. 1 is first provided with a plurality of openings or perforations 6 as shown in Fig. 2. These openings are formed in the central portion 4 of the strip and extend into the beads or hollow enlargements 2. After the strip has been thus perforated at spaced intervals the strip is separated along the groove 5 in any well known manner such as by means of a rotating knife 14.

In this manner the primary parts of the finished fastener are produced and the two stringers 1 having two series of fastener elements 7 provided with intermediate recesses 8 are simultaneously formed. Thus the transverse webs intermediate the opening 6 provide the fastener elements 7 and one series of the elements 7 can be made to engage the recesses 8 of the other series. To eliminate the possibility of sharp edges on the elements 7 the groove 5 in the central portion 4 is suitably rounded off along the edges thereof.

Thereafter the two stringers 1 having the fastener elements 7 formed from integral parts thereof may be interlocked as shown in Fig. 3 by means of a conventional type clasp 15. In other words the transverse webs which form the fastener elements 7 of one stringer are displaced so as to move within the recesses 8 of the other stringer and to interlock the two parts of the fastener elements.

ALFRED BOENECKE.



PUBLISHED
APRIL 27, 1943.
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FLEXIBLE STRIP FOR PRODUCING
SLIDE CLASP FASTENERS
Filed April 2, 1940

Serial No.
327,513

Fig. 1.

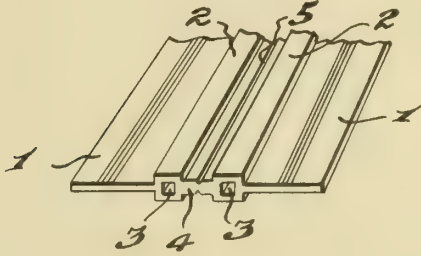


Fig. 2.

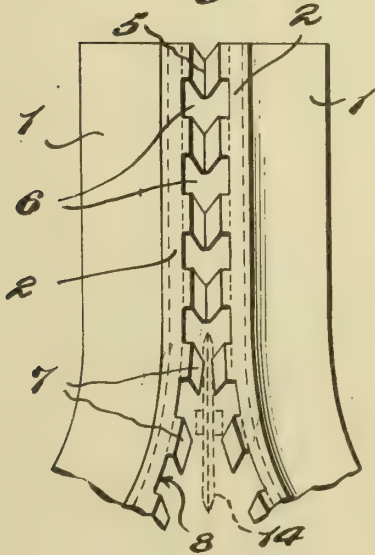
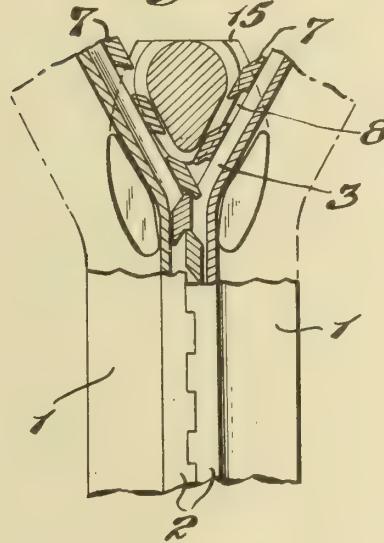
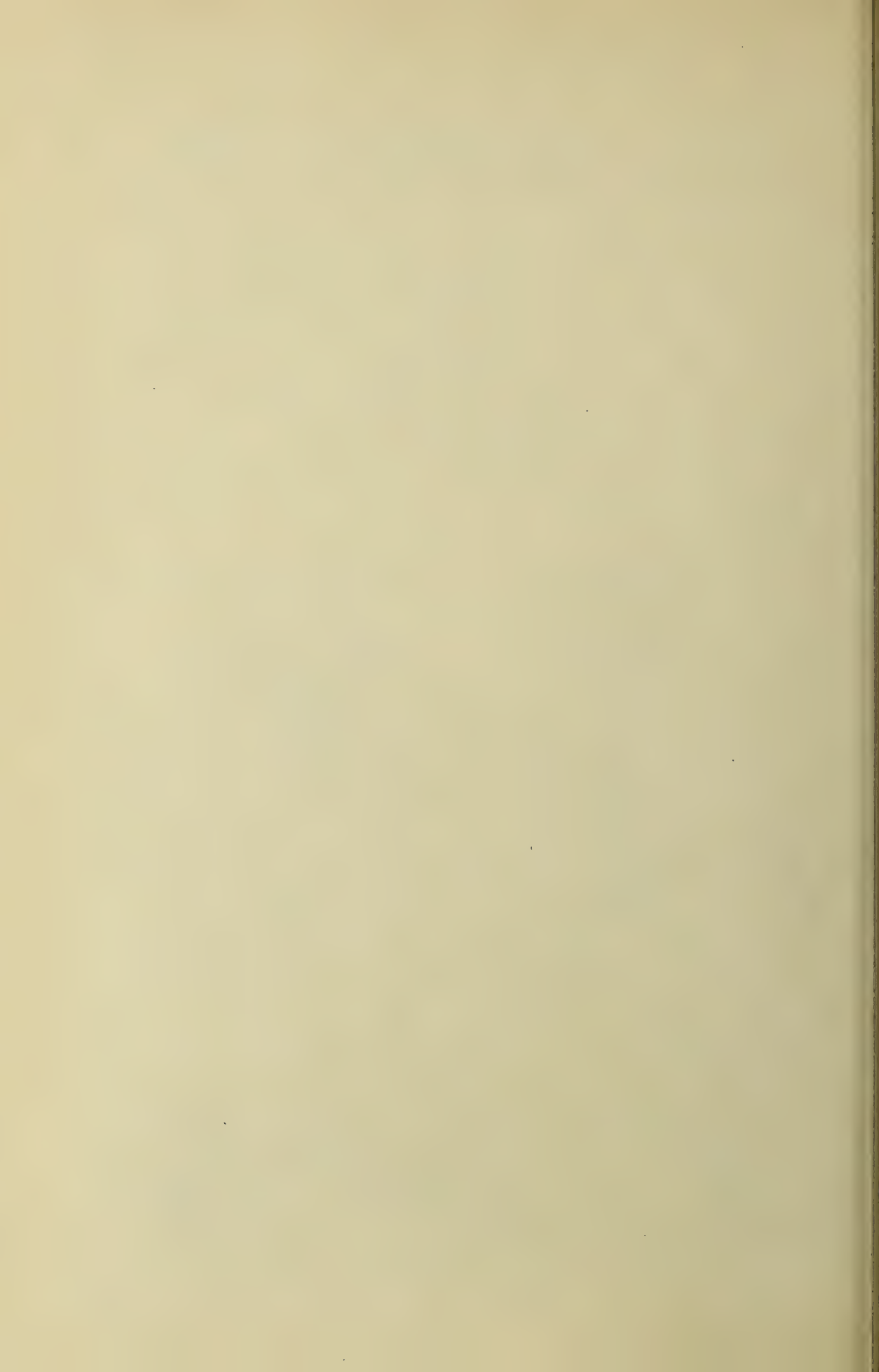


Fig. 3.



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ALIEN PROPERTY CUSTODIAN

PROCESS FOR MAKING ARTIFICIAL TEXTILE FIBRES RESISTANT TO DAMP HEAT AND TO HOT DYEING

Giorgio Chiera di Vasco, Turin, Italy; vested in the Alien Property Custodian

No Drawing. Application filed April 3, 1940

It is common knowledge that the textile fibres obtained by spinning, whipping and other similar methods of treating caseins, gelatines and other materials, artificially insolubilized or hardened (as for example those known as "lanital"), are little able to stand damp heat, so that it is almost impossible to dye and boil them as is done with wool and the like.

Dyeing operations, because of the damp heat involved, greatly alters such fibres so that the weight and tensile strength are diminished with consequent considerable waste in spinning.

Certain of these fibres change at ordinary temperatures when wetted, becoming gelatinous, soft and losing, in a word, their best properties; if subjected to boiling and hot dyeing they undergo profound changes, sometimes even to being rendered completely unserviceable in the bath.

The present invention relates to a treatment for considerably increasing the resistance of these artificial fibres, particularly those known as "lanital," and making them suitable for hot dyeing.

The applicant's studies and researches have led to the discovery that by preliminarily treating these fibres with basified metallic salts (especially salts of chromium); with soluble salts; with synthetic tannins (for example sulphonc derivatives of cresols, xilolo, etc. with formaldehyde, in which the sulphonc groups are combined with aluminium, chromium and other metals); with natural tannins (vegetable) alone or treated with metallic salts; or with mixtures of the aforementioned products, mixed together or with other substances having insolubilizing, tanning or polymerizing properties; the said fibres become considerably stronger and resistant to high damp temperatures and are therefore able to stand hot dyeing even up to boiling point.

Fibres treated in the above described way acquire a high degree of physical, chemical and mechanical resistance, really equal to that of natural wool and this particularly with regard to weight, resistance to tearing and weaving qualities.

Up to now it has been found, in practice, that the best results in increasing the resistance of such fibres are obtained by treating them with with polymerizable substances or having polymerizing properties.

Amongst these substances it has been found that urea gives excellent results, due to the fact that:

1. This substance polymerizes easily under the action of the small quantities of formaldehyde present in the fibre (either free or added) as a consequence of the preliminary production process to which they have been subjected.

2. The products of condensation and polymerization of pure urea are colourless and consequently their presence in and on the fibre treated does not alter the colouring, thus permitting all shades of dyeing, even in the lightest tints.

3. The properties of resistance and elasticity conferred on fibre treated with urea are excellent.

The treatment is made with a cold or warm solution of urea, according to the properties it is desired to confer on the fibre, and to this end other products, such as acids or basics, or acid or basic salts may be added to the urea.

An excellent result is obtained, for instance, by subjecting the "lanital" to protracted boiling for about half an hour in a 1 to 5% solution of urea.

The urea of the bath, in contact with the formic aldehyde contained in the fibre, either in free or added (residue of the manufacturing process or eventually added by a preliminary treatment), condenses on and in the fibre, increasing its resistance and elasticity and also exercising on the fibre a tanning action, i. e. an action similar to that exercised by tannin on gelatine, keratine and similar materials.

Naturally the duration of the urea bath and its strength may vary within wide limits, according to the kind of fibre being treated, or according to the results it is desired to obtain. The temperature of the bath may also vary between cold and ebullition.

In industrial practice the urea treatment may be made at any stage of the manufacturing process.

For instance, it is possible to add urea to the initial product (casein, gelatine, keratine, etc.) before coagulation or drawing, so that the fibre is formed ready impregnated with urea which reacts, together with the basic product, with the formaldehyde of the coagulating bath. Evidently, in the above described process, urea may be replaced by another substance of similar effect; in particular those capable of giving condensation products or of addition to the formaldehyde of the coagulation bath or with the other substances which may be present during the process of manufacture of the artificial fibres.

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ALIEN PROPERTY CUSTODIAN

SLIDING CLASP FASTENERS

Hermann Köhl, Stolberg, Germany; vested in the
Alien Property Custodian

Application filed April 5, 1940

The known sliding clasp fasteners with fastener elements obtained by stamping possess, amongst others, the inconvenience that, owing to their sharp edges the material on which they are mounted is easily damaged and injuries are caused to the wearers. These known sliding clasp fasteners further look as if they were not finished, because the rough stamping- or cutting faces of the fastener elements are on the outer side. This circumstance also prevents to make such fastener elements from material multicolored on the outer side, such as eloxated, enameled or varnished material as the cutting faces would be without covering.

With regard to these inconveniences of the sliding clasp fasteners composed of stamped fastener elements, it has already been proposed to make the fastener elements from wire. Sliding clasp fasteners made of interengaging wire spirals are not sufficiently yieldable and adaptable. These spirals further do not stand sharp bending, as herefrom results either a breaking or at least distorting of the spiral so that the whole sliding clasp fastener would be useless. The other proposition, according to which fastener elements consisting of wire loops or of bent wire sections with stamped closing means are provided, could not find favor with the public for the reason that the individual elements, notwithstanding very complicated auxiliary means which have been proposed, had not the solid seat on the carrying bands necessary for secure and perfect working of the sliding clasp fastener, but became loose under stresses, turned and were mutually displaced, so that the sliding clasp fastener became useless.

The invention has for its object to obviate the inconveniences of the fastener elements consisting of bent wire sections, in that first of all the conditions relating to fixed seat and mutual engagement of the elements are made more favorable and also the individual stability of the elements is increased. The fixed seat has been improved according to the invention in that the points at which the elements engage the one into the other are placed close to the edge bead and the arms of each fastener element and the bend of the same tightly embrace the edge bead of the carrying band over its whole circumference in clamping the same from all sides, so that the end faces of the two wire arms bear on the carrying band. By approaching the edge bead to the bend piece of the individual fastener element and owing to the tight gripping of the bead from all sides, a secure seat of the fastening element

is ensured and cannot be loosened even when the sliding clasp fastener is submitted to strong bending stresses.

The increase of the individual stability of the fastener element is attained according to the invention in that the bend connecting the two arms of the wire section is at the stamping of the fastening element flattened about the nose of the fastener element in order to obtain a high resistance moment, and strengthened on the opposite side by the formation of an indentation with closing lip.

In order to not impair the flexibility of the fastener chain by the stamped connecting piece, this piece is preferably of ball-shape or rounded on all sides. The fastening means proper in the connecting piece are preferably formed by stamping parallel to the axis of the element, so that the points at which the fastener elements engage the one in the other are situated close to the edge bead, the occurring bending stresses of the fastener elements being thereby reduced to a minimum. In order to make the element proper as resistant as possible against the stresses, the stamping of the fastener elements is preferably utilized to enlarge the connecting piece to above the diameter of the wire arms to thus increase its resistance moment.

A sliding clasp fastener composed of such fastener elements according to the invention is absolutely satisfactory as regards economical production, wearing properties and reliable working. The economy of its production is chiefly due to the fact that only little material is necessary for the fastener elements which can be made without waste. The fastener elements are further of simple shape, so that not only the fastening stamping can be made without difficulty, but the fastener elements can be fixed easily and securely on the carrying band. When employing material treated on the surface the same advantages exist undiminished. Thereby that the end faces of the two wire arms bear on the carrying band or that the wire sections are closed ring-like, it is possible to produce a sliding clasp fastener of perfect appearance and made of colored material treated on the surface, in that the cutting faces of the wire sections which are not provided with the covering are hidden. When shaping the fastener elements according to the invention the surface quality of the material, notwithstanding the stamping proceeding, is uniformly maintained at all points.

As the fastener elements have no longer any sharp edges or burs, as are unavoidable in

stamped elements, but are absolutely smooth on the outer side, damages of the clothes and injuries at the handling of the sliding clasp fastener are excluded. Furthermore, the sliding clasp fastener according to the invention is very flexible and yielding, so that it possesses in every respect the most favorable wearing properties.

The reliable operation of the fastener in any size of the fastener elements is guaranteed by the kind of shaping of the fastener elements and first of all thereby, that the fastener elements are absolutely securely fixed on the carrying band and cannot be brought out of position by bending or sharp bending of the fastener.

The arms of the wire sections rounded up to the carrying band are also excellently suited for a wide, flexible sliding clasp guiding, in spite of broad bearing.

An embodiment of the invention is illustrated by way of example in the accompanying drawing, in which

Fig. 1 shows in side elevation a fastener element according to the invention,

Fig. 2 is a top plan view and

Fig. 3 an end view seen from the front,

Fig. 4 is a longitudinal section through the fastener element turned by 180° relative to Fig. 1,

Fig. 5 is a rear end view, and

Fig. 6 a view from below,

Fig. 7 shows in side elevation, and

Fig. 8 in top plan view a sliding clasp fastener with fastener elements according to the invention.

The fastener element, shown in Fig. 1 to 6 as to be shifted over the edge beads of the carrying bands, consists of a bent wire section, the arms 1 of which are bent together up to a slit 2 the width of which depends on the thickness of the edge bead. The connecting piece 3 of the arms 1 form the carrier for the fastening means of the fastener elements, that is for the projection 4 and the cavity 5, situated on the other side, and having a lip 6, the projection, cavity and lip being produced by vertical stamping from the material of the wire section which is of uniform thickness over its whole length. In this instance the fastener stamping, as can be best seen from Figs. 1 and 4, is carried out so that, the wire cross section being flattened at the same time, the greatest possible accumulation of material exists on the outer edge of the element in the range of the connecting piece 3, in order that

a high resistance moment of the element is obtained.

Figs. 7 and 8 show how the fastener elements are fixed on the edge beads of the carrying bands and engage the one in the other. The edge beads 7 of the carrying bands 8 are ring-like enclosed on their whole circumference by the elements pressed together, in such a manner that the end faces 9 of the bent wire sections are close to the carrying band 8 or directly bear on this carrying band. The edge beads 7 are approximately centrally arranged in the fastener elements, in that the fastening means are placed as closely as possible to the edge bead. By this measure the forces occurring at the points of engagement of the fastener elements are of less effect for the fixation of the elements on the bead.

The fastening can take place in a zigzag line, as shown in Fig. 7, by corresponding arrangement of the fastener elements, that is by corresponding stamping of the projection 4 and of the cavity 5, or it may extend in a straight line.

The sliding clasp fastener according to the invention is distinguished especially by a secure seat of the fastener elements, which seat is absolutely maintained even at strong stresses by the fact that the fastener elements tightly enclose the edge beads on all sides by the wire sections. The sliding clasp fastener according to the invention presents the advantage, that it can be produced also from any material the surface of which has been treated, especially from eloxated, enameled and colored material, without diminishing the quality of the surface, in that the cutting faces of the wire section forming the individual elements face the carrying band. First of all the sliding clasp fastener can be composed of fastener elements of any size and of any thickness, in opposition to the sliding clasp fasteners composed of stamped fastener elements, without influencing the usefulness.

The fastener element and the fastening means are evidently not limited to the forms of construction illustrated in the drawing, but may be of any desired shape. For instance, the fastener elements may be oval or angular. Also as regards the manner of production of the wire sections one may proceed as desired. For instance, it is well possible and advisable under certain circumstances, to produce the fastener elements by die-casting.

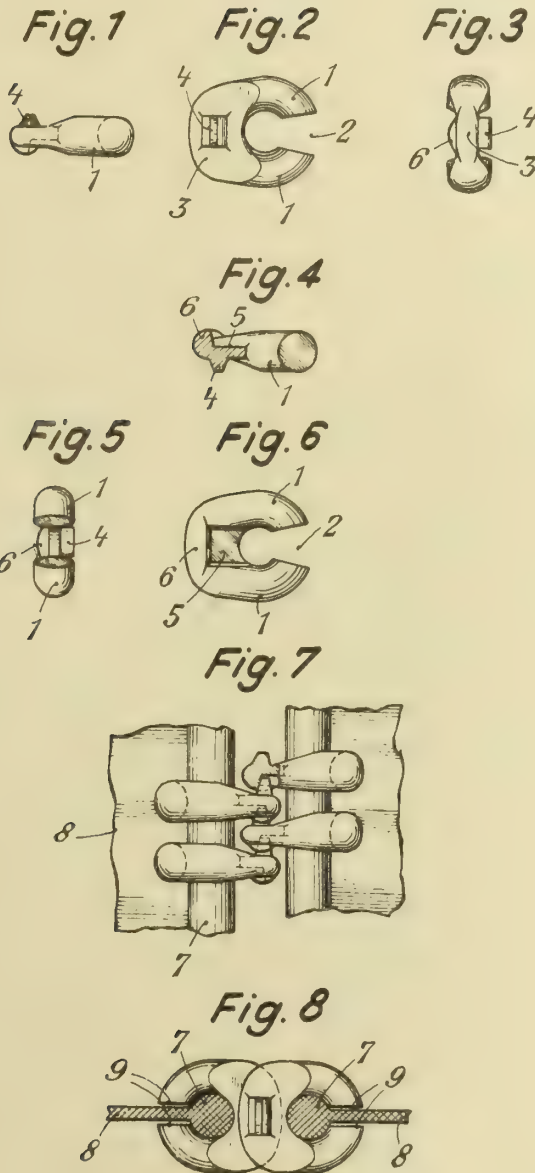
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BY A. P. C.

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SLIDING CLASP FASTENERS
Filed April 5, 1940

Serial No.
328,113



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ALIEN PROPERTY CUSTODIAN

MANUFACTURE OF FIBERS AND FOILS

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No Drawing. Application filed April 6, 1940

This invention relates to the manufacture of fibers and foils.

It is an object of this invention to produce fibers and foils of special properties.

A further object is to produce these fibers and foils from viscose solutions treated with superpolyamides.

A still further object is the provision of fibers and foils from ammoniacal copper oxyde solutions treated with superpolyamides.

These and other objects will appear from the detailed specification following hereinafter.

It has been found that fibers and foils of excellent properties are obtained, if solutions of viscose and cellulose in ammoniacal copper oxyde treated with alkali-soluble superpolyamides containing sulfamide groups, are spun or worked up into foils. Alkali-soluble superpolyamides are obtained according to the German Patent Application I. 64 124 IVd/12o, filed March 20, 1939, by condensing diamines containing sulfamide groups and/or dicarboxylic acids or their functional derivatives or salts of these acids with the diamines or amino carboxylic acids containing sulfamide groups or their functional derivatives, especially lactams.

Solutions of viscose or of cellulose in ammoniacal copper oxyde are preferably mixed with alkaline solutions of these superpolyamides and then spun in a known manner or worked up into foils. Hereby the usual coagulation agents like salt solutions or acids may be employed. The quantity of the superpolyamides, to be given to the spinning solution, may vary within wide limits. Preferably there are added not less than 5 per cent superpolyamide (related to cellulose), as otherwise the admixture of superpolyamides is of no practical value. On the other hand a multiple of superpolyamide compared with cellulose may be employed.

The fibers obtained are faster to wrinkling and possess a far higher "Bauschelastizität" (bolster-elasticity) and a more elastic grip than viscose-fibers. The grip, moreover, on account of the good "Bauschelastizität" resembles wool. Also the dyeing properties of the fibers and foils thus obtained are better than those of fibers and foils from pure viscose or pure ammoniacal copper oxyde cellulose. They absorb dyestuffs for instance much easier and can be dyed in darker shades than pure viscose or pure ammoniacal copper oxyde cellulose. Contrary to these they may be dyed with acid dyestuffs, for instance with wool dyestuffs and also with acetate silk dyestuffs. On account of the excellent dyeing

properties the fibers are very much adapted for the manufacture of mixed fabrics.

Example I

A 20 per cent solution of a superpolyamide consisting of hexamethylenediamine and N,N'-dipropylpropane-carboxylic-acid-p-sulfo-benzoic-acid-diamide (see Example I of the German Patent Application I. 64 124 IVd/12 o, filed March 20, 1939) in a caustic soda solution of about 8 per cent is added to a viscose solution capable of being spun in such a quantity, that after spinning and coagulating filaments containing about 10 per cent superpolyamide are obtained. The elasticity of these filaments is far greater than that of pure viscose filaments. The filaments, moreover, possess contrary to the others a wool-like grip and excellent "Bauschelastizität".

The filaments may be dyed by boiling one hour with 2 per cent acid anthracene red 3 BL (Schultz Dyestuff Tables, Year 1932, Vol. II, Page 187) ratio of the weights of filaments and water 1:50, by adding 10 per cent Glauber salt and 4 per cent formic acid. It is then washed with lukewarm water and afterwards dried. The shades obtained are distinctly darker than on viscose silk without addition of the superpolyamide, whereby the degree of fastness is for both kinds at least the same. If the filaments are dyed in the same way with 2 per cent palatine fast blue GGN (Schultz Dyestuff Tables, Year 1932, Vol. II, Page 108) by adding 6 per cent formic acid or with 2 per cent sirius light blue BRR (Schultz Dyestuff Tables, Year 1934, Vol. I, Page 131) by adding 20 per cent Glauber salt, also distinctly darker, but more brilliant shades are obtained than on cellulose free from superpolyamides.

Example II

An alkaline solution of a condensation product consisting of hexamethylenediamine and N,N'-dipropylpropane-carboxylic-acid-diphenylether-4,4'-disulfonic-acid-di-amide (see Example II of the German Patent Application I. 64 124 IVd/12o) is added to a viscose solution as described in Example I in such a quantity, that the finished filaments spun from the solution contain 15 per cent of the superpolyamide. They are spun in the way usually adapted for pure viscose. The filaments are very elastic and show a wool-like grip. If they are boiled one hour with 2 per cent fast-mordant-blue E (Schultz Dyestuff Tables, Year 1934, Supplementary Volume I, Page 90) ratio of the weights of filaments and water 1:50, by adding 10 per cent Glauber salt and 4 per cent

formic acid and, if afterwards treated for 45 minutes with 1 per cent potassium chromate, distinctly darker and also faster shades are obtained than on filaments consisting of superpolyamid-free viscose.

In the same way also foils can be obtained and dyed. They also possess darker shades than foils from pure viscose.

Viscose containing 20 per cent of the condensation product obtained from N.N'-dipentacarboxylic-acid-diphenylether-4.4'-di-sulfonic-acid-damide is dyed, by boiling one hour and adding 3 per cent soap, with 1.5 per cent celliton fast blue BF (Cellitonechtblau BF), concentrated powder, ratio of the weights of filaments and water 1:50. The shades are far darker than those on filaments from superpolyamide-free viscose solution, whereby the degree of fastness for both kinds is very much the same.

Example III

An alkaline solution of a superpolyamide consisting of 1 mol N.N'-dipropanecarboxylic-acid-p-sulfobenzoic-acid-diamide, 1 mol adipic acid and 2 mols hexamethylenediamine is added to a viscose solution capable of being spun in such a quantity, that the finished filaments contain about 20 per cent superpolyamide. The filaments are dyed by boiling one hour with 2 per cent sirius fast blue BRR (Siriusechtblau BRR) (Schultz Dyestuff Tables, Year 1934, Supplementary Volume I, Page 131) ratio of the weights of filaments and water 1:50, by adding 20 per cent Glauber salt. Far darker shades than on filaments consisting of superpolyamide-free viscose are thus obtained.

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ALIEN PROPERTY CUSTODIAN

METHODS AND APPARATUS FOR SPINNING
KAPOK YARNS

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Application filed April 9, 1940

This invention relates to methods and apparatus for spinning kapok or similar fibres, such as akund, imitation of kapok, paina, and the like, as well as other products obtained by means of such methods and apparatus.

It may be recalled that kapok is a natural very light fibre which is non-conductive, imputrescible, impermeable and insulating.

This fibre consists of a tube closed at its ends and the walls of which are constituted of lignified cellulose, i. e. of cellulose impregnated with a waxing or softening ingredient which gives it all of the above mentioned qualities. The walls of the fibrous tube are smooth as compared with other fibres generally used in spinning which are all possessed with so-called "pricks" and it is precisely the absence of such prickly surfaces which hitherto has prevented its use economically and industrially in this art.

Moreover, kapok fibre being very fragile, same will be broken or split by submitting it to the usual process of carding thereby rendering it unsuitable for the intended purpose.

To overcome these drawbacks it has already been proposed to proceed with the weaving of kapok by mixing same with other textile matter such as cotton or wool but it has been found necessary to mix kapok in a very large proportion with cotton or wool with the result that:

On the one hand, dyeing of the mixture is rendered difficult due to the variances of the nature of the fibres so that a second dyeing operation has been required and,

On the other hand, the mixture, due to the relatively small proportions of kapok, did not maintain the essential qualities thereof, more particularly that of imputrescibility and impermeability.

Finally, the ingredients habitually used in softening wool or cotton fibres are inefficacious for kapok fibres because, as has been stated hereabove, these fibres are agglutinated by an insulating substance (vegetable wax) which prevents the fibre from becoming impregnated.

The invention has for its main object to provide such methods and means which are adapted to respond in a higher degree as has been possible heretofore to the various requirements in this art and which, more particularly, will obviate the drawbacks referred to hereabove, and provide a product unknown heretofore.

The invention comprises, mainly, admixing to the kapok fibres to be spun or woven a certain quantity of heavier fibres such as fibres of artificial silk or rayon, this in the proportion of 5%

to 45% by weight according to the nature of the thread to be produced, such thread being always and without exception preeminently formed of kapok.

Besides this main feature, the invention has for a further object to provide arrangements which are preferably used simultaneously as will be more fully described hereafter.

A second arrangement—related in a general way to the ingredients used in softening the textile matters, more particularly kapok—comprising forming these products by a mixture containing essentially a mineral oil such as vaseline oil (preferably about 10%), at least one fatty acid such as coco acid (preferably about 10%), at least one vegetable oil such as pine oil (preferably about 4%), at least one basic salt such as sodium carbonate (preferably about 1%), the balance being constituted by water and, eventually, by at least one animal oil such as tallow (preferably about 2%);

A third arrangement—relating to the machines for carding kapok—consisting in inclining the points of the carding lining in respect of the generating lines of the drums and preferably to dispose same along helical lines so as to insure, by reducing to a minimum the contacts on account of the brittleness of the fibres, a perfectly balanced carding action;

A fourth arrangement consisting, in these same machines, to provide a combing drum having a lining with points and cooperating with the brushing drum;

A fifth arrangement comprising, in these same machines, the provision of an adjustable sub-frame cooperating with the carding drum, said sub-frame being designed to follow closely the shape of said drum and capable of being moved as closely as possible to the points, this sub-frame preventing any loss as well as blowing-off or evaporation of the substance;

And a sixth arrangement—relating to the woven products—consisting in producing these by weaving kapok threads (more particularly those obtained by the methods described heretofore and which, besides kapok fibres, may already contain other fibres) together with threads obtained from a heavier product such as rayon, cotton, wool, and the like, certain fibres being more particularly adapted to form the chain and others the weft.

The invention aims at, and more particularly, relates to certain ways of applying said arrangements and certain ways of carrying same into praxis; and it still more particularly, this as

concerns the creation of a new industrial product, aims at and relates to methods and apparatus to be used in connection with the several arrangements, the various appropriate constituent primary elements, as well the thread proper obtained by said methods and apparatus, and the products woven with this thread or obtained or formed generally in accordance with the invention.

The several features of the invention will be brought into evidence from the following description, reference being made by way of simple example to the accompanying drawings, in which:

Fig. 1 shows, schematically and in side elevation, a machine for carding kapok;

Fig. 2 shows separately the carding drum and a subframe according another arrangement;

Fig. 3 is a section of a lining, provided for the carding drum with points;

Fig. 4 is a view showing the developed lining;

Fig. 5 is a similar partial view, on a larger scale, to that shown in Fig. 4;

Fig. 6 is a perspective view showing several carding linings juxtaposed on the drum; and

Fig. 7 is a schematic section of the carding drum.

According to the invention and, more particularly, according to the preferred means of carrying same into effect, as well as to those of realizing its various parts, spinning of the kapok is preferably carried out as follows:

As new material there is used a mixture comprising, on the one hand, kapok fibres, and, on the other hand, fibres of at least one heavier textile substance, such as rayon, cotton, or several of these substances (it being understood that, preferably, rayon be used), said mixture being prepared containing the following ingredients in the respective limits of proportions, by weight:

Kapok fibres: 95% to 55% (and even 50%),
Other fibres, more especially rayon: 5% to 45% (and even 50%),

the whole being such, considering the differences in density between the kapok and the other fibres used, that the contents of kapok in the finished product be predominating, the heavier fibres in said product being adapted to act as prickings in respect of the kapok fibres.

The rayon used may be of any suitable type such as obtained, for example, by the viscous process, the acetate, copper, or collodion method, or the like, and it may be formed, as desired, from plain or hollow fibres, the latter type, however, being preferably used.

Before proceeding with spinning, the mixture is given the desired homogeneity by proceeding as described hereafter.

A layer of kapok fibres is spread out upon which a layer of appropriate softening ingredient is applied which, itself, is covered with a less important layer of a heavier carrier, such as rayon, this within the limits of the proportions indicated hereabove, this operation is repeated so as to obtain from six to eight layers. The whole is then mixed by means of the usual machines and the mixture is then transferred to a carding machine.

The softening operation is carried out in such way as to render the fibres capable of becoming rapidly impregnated and lubricated respectively so as to permit their reciprocal longitudinal sliding movement this without their abandoning the highly intimate contact which latter is ensured

by the capillary action of the softening ingredient, and, furthermore, to soften the fibres and, at the same time, increase their adhering capacity.

Due to this braked sliding motion of the fibres, the subsequent carding operation, which has more particularly for its object to place the fibres in parallel relationship by the action of the points of the carding drum, may be carried out correctly, that is to say without danger of the fibres being torn by said points.

Finally, the softening ingredient must be such as to modify the constitution of the fibre but temporarily, i. e. during the carding and spinning operations.

To this effect, it may be indicated to utilize the following formula which is given by way of example only, it being understood that only the limits of proportions of the several ingredients are given and that the several substances mentioned may be replaced by others having similar properties.

Per 100 lbs. of softening material ready to be used:

| | Pounds | Ounces |
|-------------------------------|--------|--------|
| Purified oil of vaseline..... | 10 | 11 |
| Pine oil..... | 3 | 12 |
| Greasy coco acid..... | 10 | 11 |
| Tallow..... | 1 | 14½ |
| Castor oil..... | 1 | 4 |
| Carbonate of sodium..... | 1 | 4 |
| Water..... | 70 | 7½ |
| | 100 | |

It should be noted that the proportion of water used may vary in accordance with the prevailing hygrometric conditions.

The proportion, by weight, of the softening material to be used in respect of the weight of the fibrous material to be treated depends on the density of said material and may, i.e. vary between 10 and 40%.

It may be remarked that, besides its use as a softening agent, the softening composition according to the above formula may furthermore be used as agglutinant.

The carding operation may be carried out on any known type of carding machine which, however, is conveniently provided with carding linings so as to permit of obtaining a uniform repartition of the fibres over the entire width of the lap.

Furthermore, due to the fragility of the kapok fibres, the contacts between these and the points of the lining are preferably reduced to a minimum, one contact, at least, being nevertheless ensured between each of the fibres and one of said points.

On the other hand the thickness of the fibre itself should also be considered since the carding operation shall not have for its exclusive object to secure a perfect parallelism of the fibres, but also to eliminate foreign ingredients which may be present in the kapok.

To this effect one preferably proceeds in one of the following ways.

As regards firstly the active elements of the carding cylinder (cylinder shown schematically by reference numeral 4, Figs. 1, 2, 7) it comprises linings provided with points, certain of said linings being constituted by a band of woven felt or molton 1, 2, these linings being traversed by clamps 3 made of hardened steel the extremities of which, forming said points, are preferably in-

clined in respect of said band and, consequently, of the periphery of the drum (Figs. 3 to 5).

The arrangement is preferably such that said points, on rotation of the cylinder 4, determine a helicoidal disengagement, as may be seen in Figs. 4 and 5, which may be obtained by helical winding upon the cylinder of the band 1, 2 which forms the lining with points.

Due to this helicoidal winding of the lining the number of points put in contact with the kapok is reduced to a minimum while no portion of the surface is being left uncared.

Various helicoidal windings running in opposite directions may also be provided (Fig. 6).

The linings 1 and 2 are fixed upon the cylinder by any suitable means.

Once realized, this arrangement is completed, firstly, by several operating drums 5 to 9 (Fig. 1) which are preferably provided with a continuously or discontinuously operating change speed device so as to permit choosing of the properly adapted speed for the treatment of each type fibre; said operating drums being furthermore precisely regulated in respect of the drum surface.

A combing cylinder 10 (Fig. 1) is then associated with drum 4, said cylinder receiving the web or lap 11 on leaving the drum; in accordance with another arrangement of the invention, means are provided upon the periphery of said combing cylinder which are adapted to take up foreign matters contained in the kapok which, otherwise, would eventually tear the web and thereby determine frequent breakage of the thread.

Said means are preferably constituted by a rotatable brushing cylinder 12 provided with fancy filleting, i.e. a filleting with highly flexible and relatively long steel points having a length of approximately 20 m/m.

The position of the brushing cylinder is regulated in such way that its points are flush with the combing cylinder; the distance between the extremities of said points and those of the combing cylinder being, for example, not more than 2/100 mm.

According to a further arrangement, the lower part of the carding drum 4 is preferably provided with an adjustable false-bottom or sub-frame 12 which is supported in such manner that it may be brought in close relationship to said drum so as to have clear spaces just wide enough to permit the passage therethrough of the linings 1, 2 and of the points 3.

This false-bottom may, for example, be mounted upon supports provided with set screws 13. It thus permits to circumvent any loss, ventilation and evaporation, or, in other words, to retain the fibres which have a tendency of escaping due to gravity or due to displacements of air occurring along the surface of the drum. Any other suitable means may be used to secure the same effect.

Regardless of which of the above arrangements may be used, it appears clearly that, according to the invention, a material is obtained which may be advantageously used for spinning purposes and which is perfectly adapted for weaving purposes while still retaining the remarkable qualities of kapok.

The product resulting from the mixture obtained is more particularly characterized by the features defined hereafter.

Since artificial silk, called "rayon" has a density of about 1.5 whereas the density of kapok

is only 0.15, that is 10 times less, the percentages in weight of the materials of the mixture as compared to those obtained with known mixtures, give particularly reduced percentages in volume.

The following table gives the percentages of the materials of the mixture, such as artificial silk called "rayon", compared with the percentages in weight of the mixture material.

| Percentages in weight | | Percentages in volume | | |
|-----------------------|--------------------------------|------------------------|-------|--------------------------------|
| Kapok | Artificial silk called "rayon" | Density of the mixture | Kapok | Artificial silk called "rayon" |
| 60 | 40 | 0.690 | 93.50 | 6.50 |
| 70 | 30 | 0.555 | 95.70 | 4.30 |
| 80 | 20 | 0.420 | 97.60 | 2.40 |
| 90 | 10 | 0.285 | 98.90 | 1.10 |
| 95 | 5 | 0.217 | 99.48 | 0.52 |

Thus, the use, in this mixture, of the heavy fibre of the artificial silk called "rayon" mixed with the very light kapok fibre, permits of reducing to insignificant figures the percentage in volume of the fibre of the mixture. The thread resulting from this mixture thus has the external appearance of kapok and the properties of softness, non rotting, poor electrical conductivity which are peculiar features of this fibre.

The threads made with the mixtures given in the preceding table permit of obtaining per kg. the following lengths (of a thread comparable in section to that of a thread of cotton of 5.000 metres to the kg.).

| Density of the mixture | Lengths obtained to the kg. |
|------------------------|-----------------------------|
| 0.69 | 12.000 |
| 0.55 | 15.000 |
| 0.42 | 19.750 |
| 0.285 | 29.000 |
| 0.217 | 37.000 |

These figures are only given by way of example as they are a ratio of the torsion of the thread.

In conclusion:

The addition of fibre of "rayon" in the proportions indicated herein to the kapok permits of obtaining the following technical advantages:

(a) Due to the presence of rayon feeding, a principal requirement in spinning of the kapok fibres can be realized.

(b) The proportion in volume that is to say apparent of the material of the mixture, is much reduced.

(c) The properties of the product obtained are those of kapok: non rotting, slight conductivity, impermeability, insulating qualities.

(d) The product can be dyed uniformly.

It should be noted that the invention is also applicable to a mixture of kapok and cotton since the latter material has only a slight difference in density to rayon. It would then be possible to obtain mixed threads of 40 to 5% cotton, a result never obtained, giving no difficulty in dyeing and having the advantages outlined above.

As a new industrial product various types of fabric may be obtained by utilizing kapok thread obtained in accordance with the invention.

Kapok thread may be spun in combination with rayon thread whereby a fabric is obtained which is warmer, lighter and cheaper as compared to that obtained by using rayon exclusively

and this new fabric may be dyed in the same manner as a rayon product. Analogous advantages may be obtained in combining, by spinning, kapok and linen or cotton thread.

Another fabric is made by spinning in combination a fine cotton thread with a coarser kapok thread (it being understood that the kapok thread always contains a certain addition of other fibres,) more particularly, rayon fibres. The cotton yarn may be used as chain thread, while the kapok yarn is used as weft thread. In this fabric which is very warm and solid and

which has a silky touch, the fine cotton threads disappear practically completely, that is they can neither be seen nor felt.

Still another fabric can be made by using kapok and woolen yarns; this latter fabric is warmer, lighter and cheaper than that made exclusively of woolen yarn.

A velvety appearance may be realized by subjecting the fabric to a raising or twisting operation.

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PUBLISHED
APRIL 27, 1943.
BY A. P. C.

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METHODS AND APPARATUS FOR
SPINNING KAPOK YARNS
Filed April 9, 1940

Serial No.
328,795
3 Sheets-Sheet 1

Fig. 1

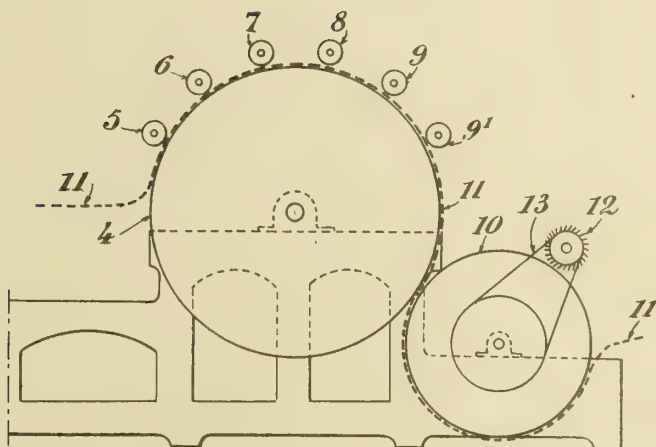
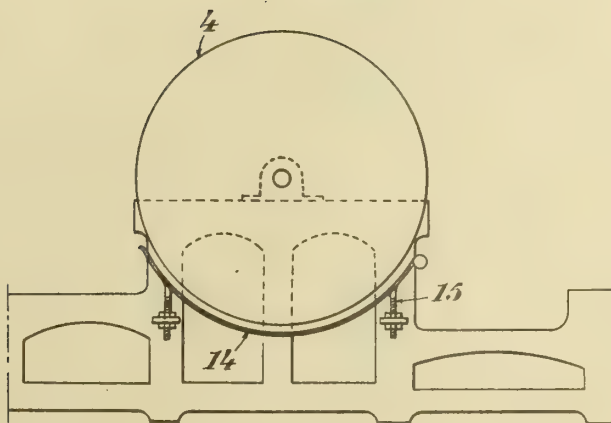


Fig. 2



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Fig. 3

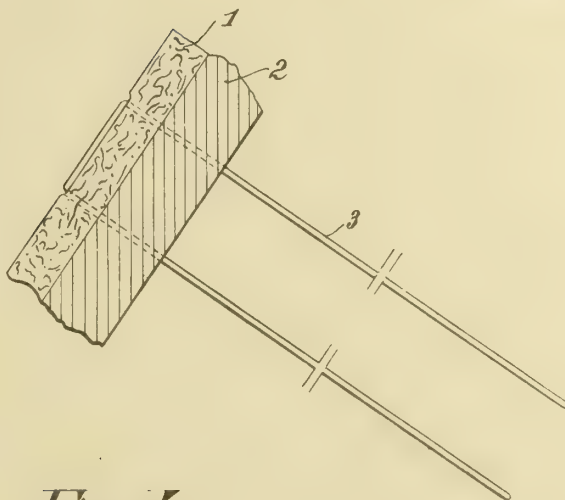
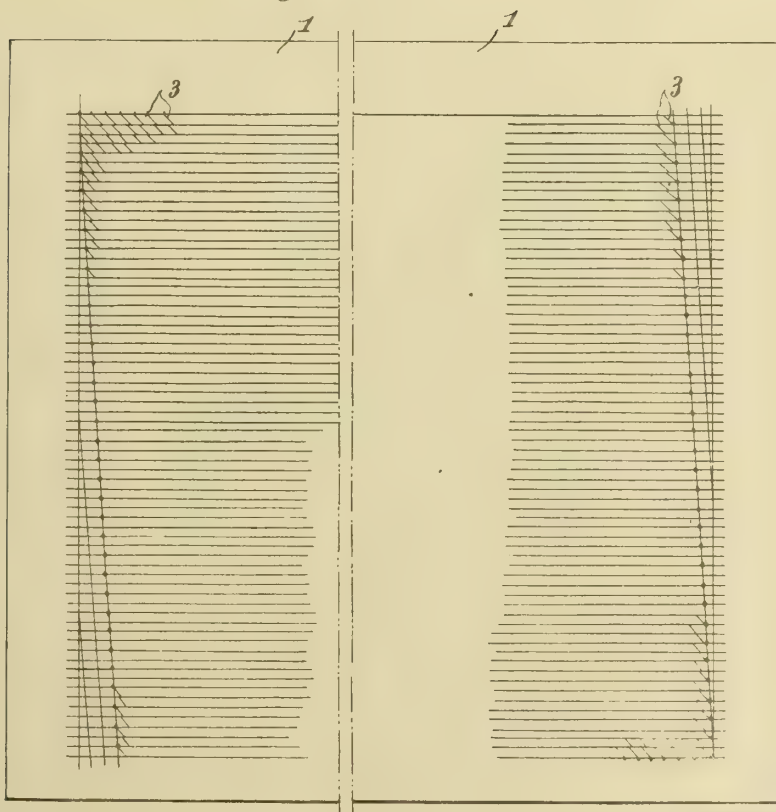


Fig. 4



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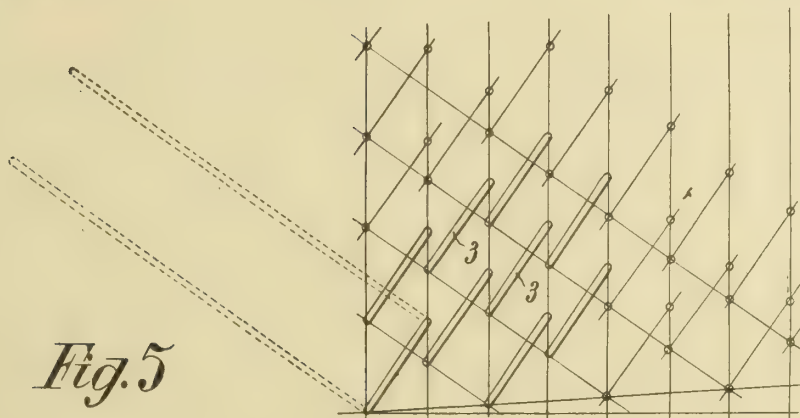


Fig. 5

Fig. 6

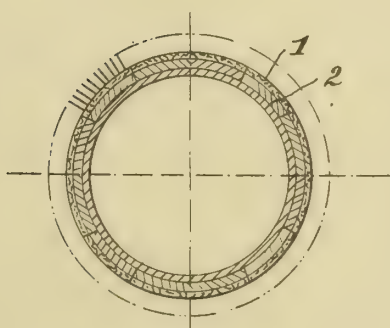
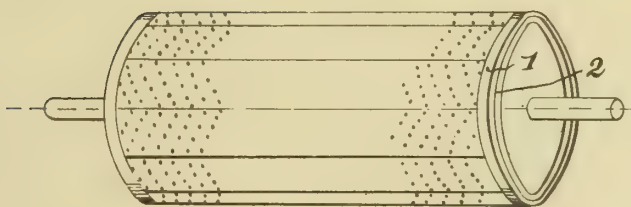


Fig. 7

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ALIEN PROPERTY CUSTODIAN

COMBUSTION ENGINES

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Application filed April 17, 1940

The invention refers to an internal combustion motor installation, composed of two or more motor-units; this installation must be able to run during a long period besides with a normal and a maximum load also with lower and eventually even with extremely low load, whereby it is of the greatest importance that also at certain definite low loads, eventually also at certain definite extremely low loads the consumption of fuel and lubrication oil is exceptionally low.

Such installation e. g. is of interest for the propulsion of such seagoing vessels which, besides having to cover long distances at normal speed, are for a long period employed in the costal service, running at small speed or of passenger vessels which in making cruises run at half power or even less during the whole voyages, and it is of still greater interest to war vessels which, besides at normal and maximum speed of 30 to 40 knots, also have to run long time at convoying speed of about 22 knots and at cruising speed of 12 to 15 knots.

Methods are known by which the purpose described above can be approximately attained. All these methods, however, make use of the so-called indirect transmission of the output of various motor-units to the propellershaft either by mechanical, electric or pneumatic means.

The invention is, however, confined to the direct transmission of the output of various motor-units to the propellershaft, so that transmission losses are avoided, and whereby simplification and as a rule saving of space, more particularly in the direction of breadth, and in many cases saving of weight and saving of expenses may be realised.

The inventor proceeds from an arrangement whereby the crankshafts of all motor-units have been placed directly in line with the propellershaft, the hindmost motor-unit has been coupled directly to that shaft, and two successive motor-units may be coupled directly by means of couplings fitted on their crankshafts so that the output of each motor-unit is transmitted to the propellershaft through the crankshafts of the motor-units situated behind. For each main service speed a certain definite output is required; this required output can be obtained at every time by uncoupling or coupling the various motor-units.

According to the invention the numbers of cylinders of the various motor-units are chosen in such a way that for each main service speed such a number of cylinders can be coupled to the propellershaft that, particularly in regard of the oil consumption, in each case the required output

of the cylinders is developed under the most favourable conditions.

The relations between the different numbers of cylinders which may be put in operation simultaneously, are preferably so chosen that the different outputs, corresponding to the different speeds desired, may be obtained by substantially uniform load of the cylinders in the different cases.

The different numbers of cylinders which may be put in operation simultaneously, can e. g. be determined by the formula

$$c = \left(\frac{v}{V} \right)^2 \cdot C$$

in which C is the total number of cylinders in the motor plant, V the maximum speed (knots) at normal load, v one of the desired lower speeds, and c the number of cylinders corresponding to the lower speed in question.

The drawing illustrates the arrangement of a ship's motor installation with direct driving. The motor installation consists of three separate motor-units A, B and C, of which A has been coupled directly to the shaft or shafts 4. The ship's propeller 3 has been fitted to shaft 4. The crankshafts of the three motor-units A, B and C can be coupled one to the other by means of the couplings 1 and 2.

It may be assumed that the three principal speeds, at which the vessel should be run with the exceptionally utmost economy, are e. g. 30, 22 and 13.5 knots respectively, the speed 30 knots corresponding to 100% of the normal output of the installation, while the speeds 22 and 13.5 knots will correspond to about 40% and 10% respectively of said normal output.

The motor-units A, B and C have correspondingly in accordance with the above formula been chosen at 5, 8 and 12 cylinders, in total 25 cylinders, which coupled one to the other develop at normal load the normal output required for the speed 30 knots.

For developing about 40% of this output at the lower number of revolutions of the propeller, appertaining thereto, the 12 cylinder motor-unit C can be uncoupled, and the remaining 5 plus 8=13 cylinders, each at about normal load, and coupled one to the other, will deliver the said output to the propeller for giving the ship a speed of 22 knots.

For developing about 10% of the normal output at the number of revolutions still more greatly reduced, appertaining thereto, the 8 cylinder motor-unit can also be uncoupled, and the remaining 5 cylinders, each almost normally

loaded, will deliver the output required to the propeller for giving a speed of 13.5 knots.

The choice of the numbers of cylinders in the various motor-units has consequently been made so as to obtain the desired different speeds by the most favourable conditions. To be able to regulate the coupled motor-units as a complete unit after having switched on coupling 1 or couplings 1 and 2, the fuel oil regulating shafts 6 and 7, or 6, 7 and 8 respectively, by which the fuel injected by the fuel oil injection pumps 5 into the cylinders is regulated, can be coupled by coupling 9, or couplings 9 and 10 respectively, so as to regulate the fuel oil injection pumps 5 of the coupled motor-units A and B, or A, B and C respectively, simultaneously and in unison.

The coupling or couplings between the motor parts may e. g. consist of a withdrawable clutch coupling, a coupling with withdrawable pins, or a friction coupling, in each case whether or not in combination with an elastic coupling, which may also, if required, be combined with an arrangement to synchronise the motor parts to be coupled before switching in.

Should it be required that coupling and uncoupling is carried out without stopping the motor-unit situated behind, it may be advantageous, in accepting a small transmission loss, to proceed to the application of hydraulic or electric couplings. In this instance, however, fuel regulating continues to be possible, as these couplings have a fixed relation between the number of revolutions, moment to be transmitted and slip incurring.

The inventor originally proceeded from the idea that it must be possible to put out of operation part of a 12 cylinder marine engine not required, when it is desired to run the vessel at a small load during a long period. The remaining cylinders could then continue to operate at their normal mean indicated pressure, that means economically, and the part out of operation need not needlessly be run which would unfavourably affect the mechanic efficiency.

On elaborating the idea, it has proved that this plan could technically be carried out, but it also proved to be possible to put out of operation additional parts of the engine, should one desire to provide additional speed stages for the vessel. It appeared that this would involve splitting the 12 cylinder engine into various independent motor-

units which by means of couplings on the crankshafts could be switched on or off, and yet could be attended to as a single unit by one engineer, by coupling the fuel oil regulating shafts.

From a technical point of view there is no objection to enlarging each of these motor-units to a motor having a large number of cylinders and of considerable output, so that in this manner also the problem has been solved to apply an extraordinary large power to the propellershaft, whilst maintaining the advantages of direct drive.

The transmission of the outputs through the aftermost crankshaft does not involve impractical dimensions of the shaft, because a small increase in diameter of the shaft is sufficient already to permit the transmission of a considerably additional output.

It proves, however, that it is also not necessary that all motor-units are built up of the same cylinders; there may be motor-units with large cylinders and units with small cylinders; even the motor-units may consist of various types, as by the coupling of the regulating shafts it is possible to manoeuvre with the whole apparatus as though it were one motor.

The invention may also find application to motor installations driving other machines, whereby extremely variable loads occur during long time, and whereby it is of importance, that at some of these loads, the machine is run with an exceptionally low fuel consumption.

As instances are stated the propellers of an aeroplane, the driving wheels of a locomotive or motor-car, the centrifugal pumps of sewage pumping stations and polder pumping stations, etc.

On each application it will depend on the nature of the service whether the couplings between the crankshafts will be chosen of such construction that the coupling or uncoupling can be carried out whether or not with the engines being in operation.

Cases may present themselves where the motor-crankshafts are in line of and directly coupled to a mainshaft driving one or more machines by means of mechanic or electric transmission.

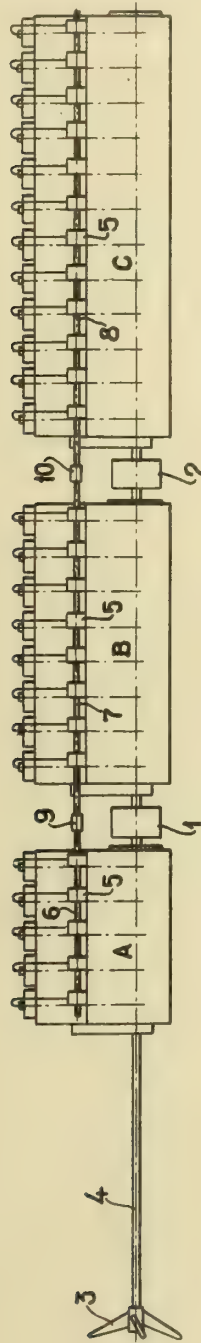
This e. g. refers to twin-screw motorboats of which the motor installation, driving both propellers, has been placed on the centerline of the boat.

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BY A. P. C.

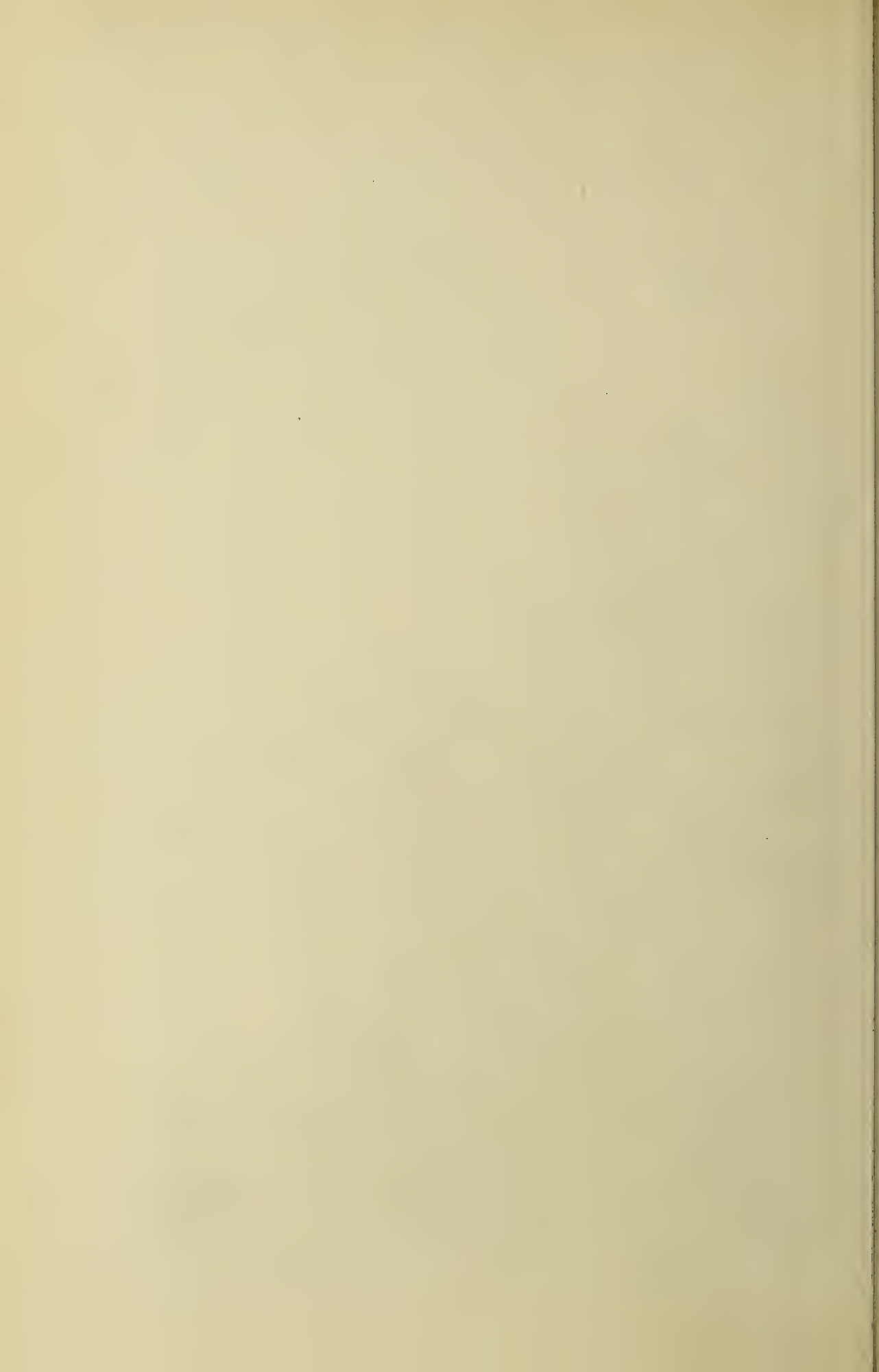
J. B. GILJAM
COMBUSTION ENGINES
Filed April 17, 1940

Serial No.
330,189



Inventor,
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ALIEN PROPERTY CUSTODIAN

METHOD OF AND ARRANGEMENT FOR EXTRACTING METAL BODIES FROM WEBS OF TEXTILES MATERIALS

Hubert Duesberg, Brussels, Belgium; vested in the Alien Property Custodian

Application filed April 18, 1940

In the treatment of textile materials by means of cards, it frequently happens that the web of textile material contains foreign bodies, in particular metal bodies, such as card teeth. The presence of these foreign bodies considerably interferes with the working to which the web is subsequently subjected and in particular when the actual card is followed by an arrangement intended to eliminate by calendering the impurities such as hard ends, loose fibres and the like, which the aforesaid web may contain.

The calendering of the web is carried out through the intermediary of two ground rollers called calender cylinders, between which the web passes.

The metal bodies, which are of harder composition than the ground rollers, score these rollers and gradually reduce their efficacy. It is then necessary to have these rollers ground, in order to restore thereto the qualities necessary for the work which they are to accomplish, which entails a loss of time and money and a loss of output, since the removal of the calender rollers necessitates temporarily placing the machine out of service.

In order to overcome this disadvantage, it is proposed in accordance with the invention to submit the web of textile material to a magnetic action before its introduction between the calender rollers, this magnetic action having the effect of freeing the web from any metal impurity which may impair the operation of the said rollers.

Further features of the invention will appear from the following description.

The accompanying drawing shows by way of example an arrangement for carrying the method into effect.

Figure 1 is a diagrammatic profile view of the rear part of a carding machine provided with an arrangement for calendering the web of textile material and with an arrangement having a magnetic action;

Figure 2 is a view in perspective, partly broken away, of a particular form of the magnetic separator;

Figure 3 is a diagrammatic view of the winding with which the said separator is provided;

Figure 4 shows the application of the said separator to a carding installation.

The web 2 (shown in dotted lines) according to the invention, which is composed of textile materials passing over the drum 8, is fed on to the card comb 3 and is detached from the latter by the action of the comb 4, to which a constant

oscillatory movement is imparted. When the web leaves the card comb 3, it is brought on to an endless belt 5 or any other similar device, whence it passes between the calendering rollers 6 and 7. Since the web 2 frequently contains card teeth removed from the carding devices (drum, comb and the like), these card teeth score the calender rollers in passing therebetween and rapidly render them unserviceable.

In order to prevent this disadvantage, it is proposed according to the invention to mount over the entire width of and below the textile web, between the comb 3 and the calender rollers 6 and 7, a magnet 9, by the action of which the aforesaid web is freed from any metal bodies. This magnet 9 may be constituted by an electromagnet fed either with direct or alternating current, or it may be constituted by a permanent magnet.

Any desired regulating system may also be provided for the vertical adjustment of the magnetic source. A cleaner for removing the metal bodies which have been extracted from the web by the aforesaid magnetic source may also be connected to the arrangement.

The magnetic separator shown in Figure 2 comprises a casing, the side walls 10 and 11 of which are constituted by a sheet of soft steel about 3 mm. thick. These two sheets disposed obliquely with respect to one another, so as to form a kind of inclined plane, are connected together by a zone 13 of a non-magnetic alloy, commencing at a distance of about 15 mm. from the edge of the said inclined plane. The aforesaid zone extends over a length of about 10 mm. and its composition is, for example, the following:

| | Per cent |
|-----------------|----------|
| Lead | 50 |
| Tin | 49 |
| 5% phosphor-tin | 1 |

Inside the said casing is disposed a series winding 14 (see also Figure 3) provided with a circuit breaker 15 and fed, for example, at 12 volts.

This magnetic separator is disposed (see Figure 3) in the neighbourhood of the comb 4 in such manner that its face 10 is situated at about 25 mm. from the periphery of the card comb 3. In addition, this separator is so mounted that its rounded edge 16 is situated in the neighbourhood of the web 2 of textile material, but without the latter touching the said edge.

HUBERT DUESBERG.

THE HISTORY OF THE

REIGN OF
HIS MAJESTY
GEORGE THE THIRD

By JOHN GAY, Esq.
Author of the *Beast of Policy*, &c.
In Four Volumes.
LONDON: Printed by J. DODD, in Pall-mall; and by J. HODGKINS, in St. John's Street, 1764.

THE HISTORY OF THE REIGN OF HIS MAJESTY GEORGE THE THIRD, by John Gay, Esq. is a work of great merit and interest. It is a history of the reign of one of the most illustrious monarchs of Great Britain, and is written in a style of great elegance and simplicity. The author has been very successful in his attempt to give a true and impartial account of the reign of George the Third, and his history is one of the most interesting and valuable works of the kind.

The reign of George the Third was a period of great glory and achievement for Great Britain. It was a period when the country was at the height of its power and influence, and when it was able to maintain its position as the leading nation of the world. The reign of George the Third was also a period of great internal peace and prosperity, and it was a period when the country was able to enjoy the fruits of its power and influence.

The author of this history, John Gay, Esq. is a man of great talent and ability. He was a man of great learning and industry, and he was a man of great courage and integrity. He was a man who was able to see the truth in all things, and he was a man who was able to write about it in a clear and concise manner.

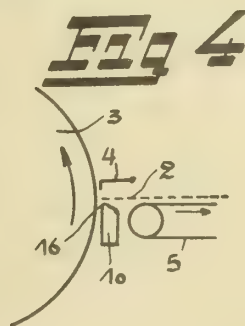
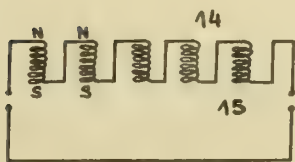
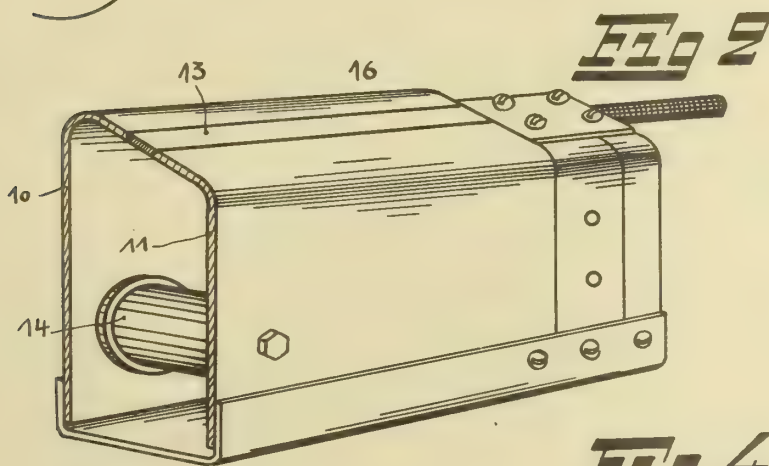
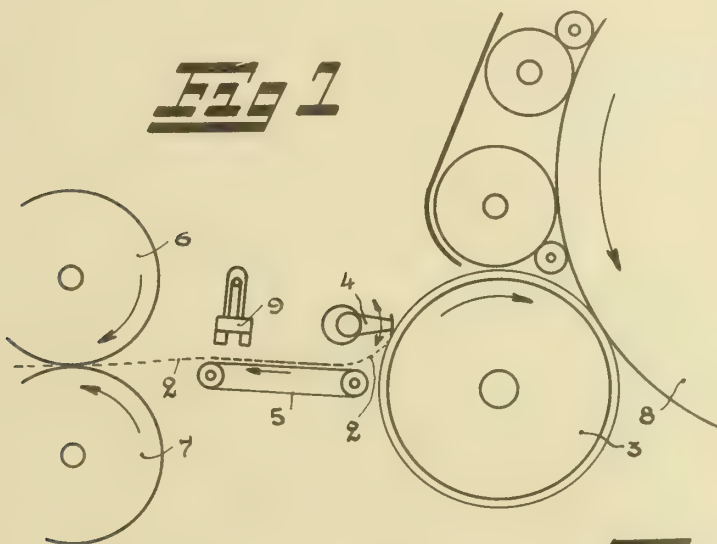
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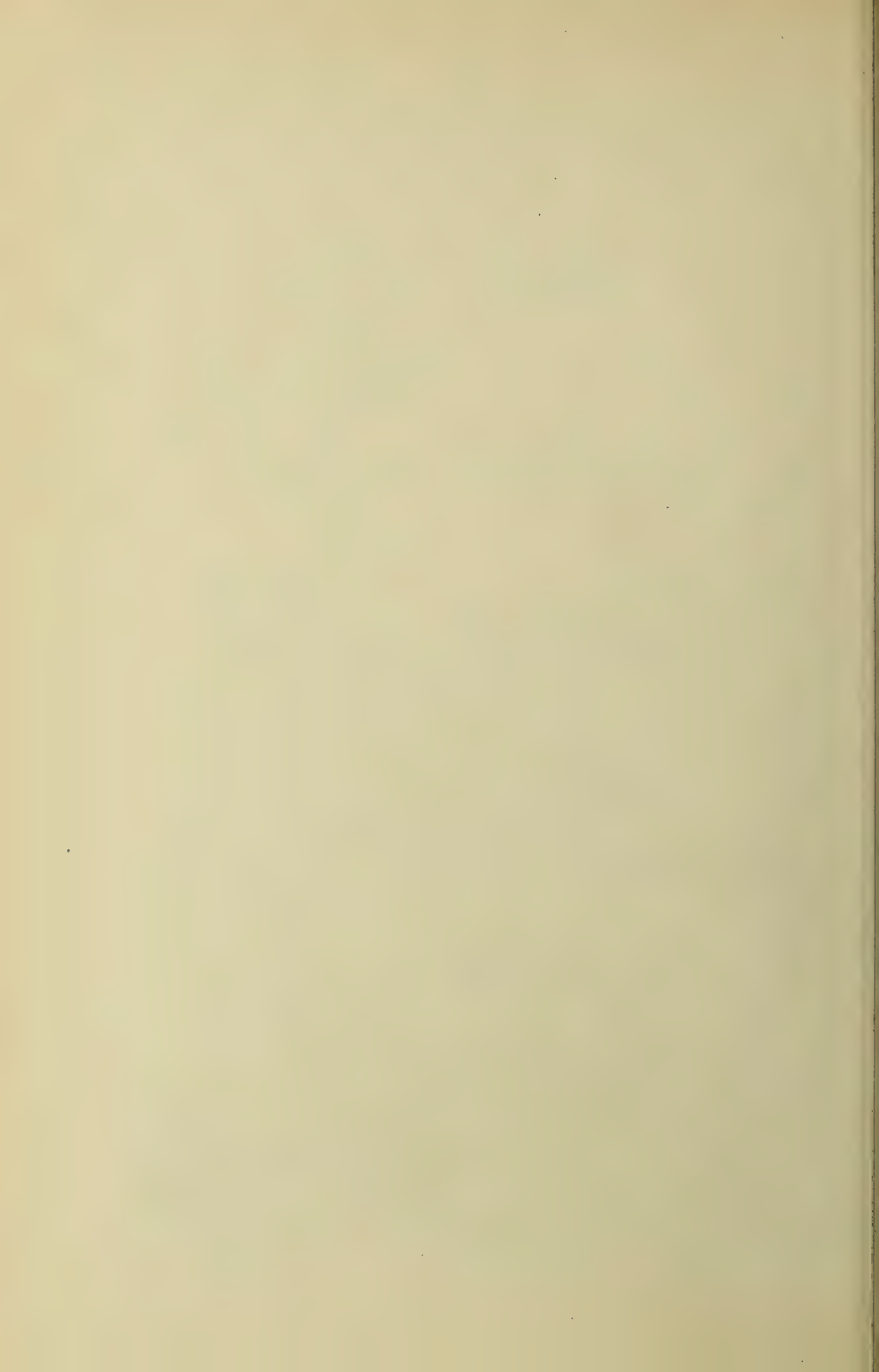
H. DUESBERG
METHOD OF AND ARRANGEMENT FOR EXTRACTING METAL
BODIES FROM WEBS OF TEXTILES MATERIALS
Filed April 18, 1940

Serial No.
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ALIEN PROPERTY CUSTODIAN

SYSTEMS FOR COOLING A FLUID CHARGED WITH THERMIC ENERGY

Georges Boulet, Plessis-Robinson, France; vested
in the Alien Property Custodian

Application filed April 18, 1940

The present application forms a continuation-in-part application of my co-pending application Serial No. 132,877 filed March 24, 1937.

The present invention relates to systems for cooling a fluid charged with thermic energy obtained, for example from an explosion or an internal combustion engine, mounted on a vehicle, more particularly on board an aircraft. It is known that for a present 1,000 H. P. engine, the fluid, in general a cooling liquid for the engine, carries 450 H. P. away with it and that the mass of fluid represented by the exhaust gases carries 1,600 H. P. away with it.

The primary object of the present invention is to effect a partial recuperation of such energy which has hitherto been dissipated as pure waste in the form of an elevation of temperature of the air.

These cooling systems always comprise a group of hollow radiating elements which are assembled together in such a manner that the opposite faces of the wall of each element are respectively swept by a current of cooling air and by a current of said cooling fluid.

According to the invention, these hollow elements are so shaped that each of the air passages they limit between them is divergent in the direction of flow of the air, the divergence being calculated in dependence on the expansion of the air caused by the thermic energy with which the cooling air is charged as it passes through said passages, in such a manner that the velocity of flow does not undergo any increase due to said expansion.

The foregoing arrangement acquires quite a particular advantage when, according to another feature of the present invention, it is combined with another arrangement that has the effect of at least partly converting into pressure the kinetic energy of the cooling air passing through said passages.

The arrangement which is intended for this conversion may be of a known type and consists for example of a divergent pipe placed in front of the whole of said radiating elements and supplying them with cooling air which then escapes through a convergent pipe placed behind them, or again said arrangement may consist in increasing the divergence given said passages when only the expansion is taken into account so that this conversion of kinetic energy into pressure energy is at least partly effected when passing through said passages.

By way of a non-limitative example, there has been shown in the accompanying drawing:

Fig. 1 is a perspective view of radiator sheets arranged according to the invention;

Figs. 2, 3, 4 are respectively diagrammatical side, elevational and front views of a radiator provided with sheets of the type shown in Fig. 1;

Figs. 5 and 6 are views on a larger scale showing the assembly of the sheets on the collectors;

Fig. 7 is a detail view of the end of the sheets;

Fig. 8 is similar to Fig. 1 and shows a modification of construction;

Figs. 9, 10 respectively show plan and front views of a radiator provided with sheets of the type shown in Fig. 8;

Fig. 11 is a transverse section along the line XI—XI of Fig. 9;

Fig. 12, which is similar to Figs. 1 and 8, shows another modification of construction;

Figs. 13 and 14 show diagrammatically side and front views of a radiator provided with sheets of the type shown in Fig. 12;

Fig. 15 is a diagram of the basic arrangement of a recuperating radiator according to the invention;

Figs. 16 and 17 are diagrams showing the evolution of the cooling fluid during its passage through the arrangement of Fig. 15;

Figs. 18 to 21 show various examples of construction of the arrangement of Fig. 15;

Fig. 22, which is similar to Fig. 1, shows a modified construction of the arrangement of Fig. 15;

Figs. 23 and 24 show diagrammatically two embodiments on an aeroplane of the arrangement of Fig. 15;

Fig. 25 is a diagram representing an energy recuperating radiator according to a modification of the principle illustrated in Fig. 15;

Figs. 26 and 27 are diagrams showing the evolution of the cooling fluid during its passage through the arrangement of Fig. 25;

Figs. 28 and 29 show diagrammatically a radiator according to the invention applied to the recuperation of the energy of the exhaust gases;

Fig. 30 is a diagram of a particular arrangement for cooling a fluid under pressure;

Fig. 31 is an elevational view of a fuselage of an aeroplane equipped with a radiator according to the invention, said radiator being that of Fig. 32, shown partially as in section along the line XXXI—XXXI of Fig. 32;

Fig. 32 is a diagrammatical longitudinal section of a liquid radiator;

Fig. 33 is a partial end view of the radiator of Fig. 32;

Fig. 34 is a similar view to Fig. 31 of a modification of construction;

Fig. 35 is a corresponding plan view of same, and Fig. 36, an end view;

Figs. 37 and 38 are views of other modifications;

Fig. 39 shows diagrammatically an application of the invention in the case of an air cooled engine, and

Fig. 40, an application of the invention to an automobile radiator.

In the embodiment of Fig. 1, the hollow radiating elements through which passes the hot fluid to be cooled are sheets 1 of lenticular cross section, the edges of which form knife edges 2. Bars 3 extending transversely to the direction *f* of flow of the cooling air are located inside each sheet, the walls of which are fixed thereto, preferably by welding, and they reinforce said sheets 1 at the same time as they divide the inside into a number of compartments which do not communicate with each other. Said sheets 1 are so arranged that the air flow passages that they limit between them are divergent, that is to say gradually increase in cross-section, in the direction *f* of flow of the cooling air. It will be observed that from the point of maximum thickness of the sheets, the divergence of the passages 4 is compensated for by the decrease of thickness of the sheets towards their outlet edge so that from this point, the total thickness remains substantially constant.

Figs. 2, 3 and 4 show a general view of a radiator composed of a group of radiating elements of the type of those of Fig. 1. The longitudinal edges of the sheets 1 are embedded and welded in lateral collectors 5 and 6 (Fig. 5), which respectively serve for the inlet and for the outlet of the fluid to be cooled; the collector 5 is provided at its upper part with a tubulure 7 for the inlet of said fluid and the collector 6 with an outlet tubulure 8.

It will be observed that in this embodiment, the divergence of the passages 4 is obtained by increasing only one of the dimensions of their cross-section, in this case the height. It would of course be possible to obtain it by means of an evolution of both dimensions of said cross-section, viz. height and width.

Fig. 7 shows a method of obtaining sheets with knife edges. The two walls 9 and 10 of the sheet, made of thin sheet metal, are welded to each other at 11 and the whole arrangement is moulded after optionally adding material by welding at 12 in order to make the surface of the joint absolutely continuous.

In the modification of construction of Fig. 6, the sheets 1 pass at their opposite ends through metal plates 13, 14 to which they are welded and the projecting ends of the sheets are splayed and welded on the tubes 15 which have holes 16 drilled right through them and opening into the sheets. The tubes located on the same side are connected to each other at one end by a vertical collector not shown, the flow taking place in the direction shown by the arrows.

In the above example, each sheet differs in cross-section from the adjacent sheets and at the most two sheets symmetrically arranged in the whole block have the same cross-section.

For simplifying the construction, recourse may be had to the construction of Figs. 8 to 11. In these figures, the longitudinal section of each sheet also has an evolutive shape of variable thickness, terminating in knife edges, but all

the sheets are identical and parallel with each other; in order to prevent the increase of thickness of each sheet from its inlet edge from producing a decrease of the passage cross-section between two adjacent sheets whereas it is precisely desired to obtain a gradual increase of said cross-section, the sheets are suitably curved throughout the portion located between their inlet edge and their point of maximum thickness in such a manner that the curved passage limited by the curved parts of two adjacent sheets has the required divergence.

In the example of Figs. 8 and 9, the divergence of the passages between the sheets 1a is obtained simply by the variation of the thickness of the sheets and the curvature of their front part, the sheets being of constant width throughout their length, as shown in Fig. 9.

In the example of Fig. 12, the variation of the thickness of the sheets 1b and the curvature of their front part are so calculated that the distance between the walls of the two sheets 1b delimiting a passage 3 remains constant, the required divergence being obtained by a progressive increase of the width of the sheets 1b (Fig. 13).

It would of course be possible to vary both the width of the sheets as in Fig. 13 and the distance between the walls of the two adjacent sheets delimiting a passage 4 as in Fig. 8.

The sheets of Figs. 8 and 12 are preferably constructed in the manner described above with reference to Fig. 7.

Whatever be their shape, the sheets 1a or 1b may be assembled on collectors and form a heat exchange block as described above in connection with the sheets 1 of Fig. 1 and shown in Figs. 3 and 6.

The sheets 1 or 1a of constant width have the advantage of enabling a plurality of blocks to be juxtaposed side by side as shown in Fig. 9, it being possible for the same collector to be used for the circulation in the sheets of the two blocks between which it is located.

In every case, the evolutive cross-section of the sheets for obtaining divergent air flow passages and knife edge sheets for improvements in the usual radiators, which improvements could moreover be used separately although their maximum efficiency is obtained when they are used simultaneously. One of said improvements have the effect of increasing the permeability of the radiator by improving the guiding of the air and the correlative elimination of vortices, in particular at in the inlet, of consequently decreasing the drag, the other of eliminating the fall of pressure produced in the usual radiators by the expansion of the air, which is expressed by an increase in the velocity of flow of the air.

In the foregoing examples the divergence of the passages 4 may be so arranged that the air flows at a decreasing velocity in order to take into account the decrease in its cooling power as it becomes heated by flowing through said passages.

On the other hand, the divergence of said passages becomes of maximum advantage when it is associated with an arrangement whereby the kinetic energy of the cooling air is at least for the greater part converted into pressure energy, preferably before the air comes into contact with the heat exchange walls, and with an arrangement that then converts a part of the pressure of the heated air into velocity, as shown diagrammatically in Fig. 15 according to which a pipe 21 has a divergent cross-section between the points A and C, a convergent cross-section from C to D

and a heating cross-section between the point C and a point B located between A and C. By passing through said pipe 21 a fluid which enters at A at a velocity V_A and flows out at D at a velocity V_D , the diagram of Figs. 16 and 17 is obtained in which V designates the specific volume of the air, T its absolute temperature, v its velocity and p its pressure, the values of these various magnitudes at the various points A, B, C, D being indicated by a corresponding index.

According to said diagram, there is a compression of the air from A to B, a slight compression of the air from B to C by a continuation of the conversion of pressure into velocity at the same time as there is a heating of said air, the divergence of the cross-section B, C being calculated for this purpose, then expansion from C to D. The energy recuperated is represented by the area A B C D of Fig. 17. It is obvious that it is advantageous to increase the pressure of the air as much as possible before heating the latter and bringing it to the point B and that it is also advantageous for said heating to be effected without loss of pressure, whence the advantage, as regards recuperation of energy, of a radiator with divergent passages as described above.

The cycle in question may be obtained by means of very varied arrangements as shown for example in Figs. 18 to 21, in which the radiator has been shown diagrammatically and its divergence shown by a divergence of its outer walls, although it may be obtained in any one of the previously described manners. In the example of Figs. 18 and 19, a divergent passage 23 conveys the air directly to a divergent portion 24 and the latter is followed by a convergent passage 25 that opens directly into the surrounding medium.

In the example of Fig. 20, a tube 26 of constant cross-section is interposed between the divergent passage 23a and the radiator 24; similarly a tube 27 is interposed between the radiator 24 and the convergent passage 25a. This arrangement offers the advantage of decreasing the friction in the case in which pipes of great length are used for conveying the air to and from the radiator.

Fig. 21 shows a combination of the two previous ones. A first divergent passage 28 is followed by a pipe 29 of great length, of constant cross-section, itself followed by a second divergent passage 30 opening into a radiator 24. Similarly, the radiator is followed by a first divergent passage 31 followed by a pipe of constant cross-section 32 which opens into a second convergent passage 33. The conversion of velocity into pressure and conversely are thus each effected in two successive stages. The pipes of great length 29 and 32 are consequently of smaller cross-section than the pipes 26 and 27 of Fig. 20, but since the velocity of flow is greater for the same inlet velocity, the losses by friction are greater.

In these arrangement of Figs. 18 to 21, the divergent and convergent passages outside the radiator may be constructed so that the conversion of velocity into pressure and conversely are completely or for the greater part effected therein, the divergence of the radiator being so calculated that at the outlet of the radiator, the velocity of the air is substantially the same as at the inlet or slightly lower. It is possible, instead of this, to do the reverse and effect these conversions in the actual passages of the radiator unit. Fig. 22 offers an example thereof. In this example, the sheets are of the type of those of Fig. 12, that is to say curved at the inlet and at the outlet, but their curvature is more accentuated, the curved

portion longer and the front end 34 of the sheets is solid so that said front parts limit divergent passages that the air passes through before coming into contact with the hollow parts of the sheets and wherein its velocity is converted into pressure to an extent that depends on the degree of divergence given to said passages.

Such a radiator unit may be used alone, in which case the air enters and flows out through pipes of constant cross-section (Fig. 24), or again in combination with outer divergent and convergent passages, that is to say that the radiator 24 of Figs. 18 to 21 would be of the type in question, the divergence of the passages of the radiator unit being suitably calculated in both cases.

The use on an aircraft of the above described arrangements may be effected in very different manners. Fig. 23 shows an example in the case of a thick wing 36; in this example, a divergent passage 37 opens into the lower side of the leading edge of the wing and its general direction deviates but little from a line parallel with the chord of the wing; it is followed by a radiator 38 which is in this case of the type shown in Fig. 8 and which is arranged obliquely across the wing; said radiator opens into a convergent passage 39 which opens on to the upper side of the wing.

The example of Fig. 24 is a modification of the previous one; the radiator is of the type shown in Fig. 22; the air is conveyed to it through a pipe 40 which is arranged like the divergent passage 37 but which is of constant cross-section, the divergence of the curved parts of the sheets being so calculated that it is at that spot that all the conversion of kinetic energy into pressure is effected; a pipe 41, similar to the convergent passage 39 but of constant cross-section, exhausts the air that has passed through the radiator, the curved part of the sheets having performed the function of the convergent passage 39.

All the other usual arrangements of radiators on aeroplanes may be used and also the devices intended to vary the inlet and outlet cross-sections in order to modify the cooling.

Instead of constructing a radiator in which the heat exchanges are effected at substantially constant pressure as explained above, it is possible, according to a modification of the invention, to construct a radiator in which the heat exchanges are effected at constant volume. Fig. 25 shows diagrammatically such a radiator which essentially comprises heat exchange elements 45 including air flow passages 46, the inlet and outlet orifices of which are controlled by valves 47a and 47b, in this case plugs rotating at the same speed, each of which is calculated so as to enable it to place one of said orifices in communication with a corresponding collector 48. In the inlet collector opens a divergent air inlet tube 49 and the outlet collector is extended by a convergent tube 50.

The valves 47a and 47b are designed to ensure the following functions:

Filling of the passages 46 with fluid at the pressure p_1 in the inlet collector 48;

Fluid-tightness of the passages 46 during the period of the heat exchange;

Transfer into the outlet collector 48 and expansion to the pressure p_2 equal to or less than p_1 .

The relative setting of the two plugs and the relative size of the fixed openings enable the following sequence of operations to be obtained: opening of 47b, transfer to and expansion in the outlet collector 48, opening of 47a, closing of 47b with an overlap of these two operations in

order to obtain a scouring and a renewal of the air in the passage 46, transfer to said passage 46 of the fluid in the inlet collector 48, closing of 47a, the of 47b in such a manner that there is a period of simultaneous closing and consequently a heating at constant volume of the air in the passage 46.

There will be in this case, at each half-turn of the plugs, a cycle whereof the diagram is that shown in Figs. 26 and 27 and which is that of the most general and most efficient explosion cycle. This arrangement may consequently be used as a reaction engine by injecting fuel into the passages 46, the elements 45 in that case not serving to convey calories to the fluid passing through the passages 46, but to remove them.

The arrangements described above may be adapted to various applications; in particular, the heat exchangers may be used as radiators for the cooling liquids of liquid cooled engines, as radiators for oil or for cooling by means of the air delivered by the supercharging compressors of an engine, or again as radiators for exhaust gases. In this latter case however, the flow inside the sheets, instead of being effected transversely to the flow of the air, will preferably be effected from one end to the other of the sheets and in the same direction as the air is flowing.

In the example of Figs. 28 and 29, the sheets 51 are open at their outlet end and the inside of each sheet forms a divergent passage throughout its length. The outlet cross-sections and the depth of the sheets are preferably calculated in such a manner that the air and the exhaust gases have the same temperature and the same velocity at the outlet of the sheets in order to ensure the continuity of the flow. There will therefore be in this case, over and above the total addition of the calories of the exhaust gases, a propulsive reaction inside the sheets.

The sheet radiators which are particularly well adapted for carrying out the invention, have the drawback of badly withstanding an internal pressure. In order to enable this type of radiator to be used in the case of cooling by means of a liquid under pressure (water at 2 or 3 kgs. for example) recourse will be had to the arrangement shown diagrammatically in Fig. 30 and in which the radiator 55 is inserted in a closed circuit 56 through which flows a liquid at a low pressure of flow, which circuit is provided with a heat exchanger 57, in this case a chamber in which bathes a coil of pipe forming part of another closed circuit 58 through which flows a liquid under pressure that circulates in the engine 59 to be cooled. The liquid of the low pressure circuit 56 may be any liquid but preferably, in order to reduce the size of the radiator, a liquid will be used which has a high boiling point, such as ethylene-glycol for example.

This combination of a high pressure circuit with a low pressure circuit may also be used with equal advantage and without exceeding the scope of the invention, in the case of honeycomb radiators or of any other type of radiator, whether or not they are adapted to produce a recuperation of the thermic energy.

The particular shaping of stream lining above described for the air chamber of radiators may also be applied to a ring shaped radiator including coaxially disposed annular sets of heat exchange elements, each set comprising ring shaped tubes disposed in concentric rings. Such a radiator could preferably be placed in a Naca cowl-

ing or the like and annular curved air guiding elements may also be provided along the inner and outer ranges of each set.

The radiator shown in Figs. 31 and 32 has two manifolds 61 and 62 formed by hollow coaxial rings spaced from each other and, between said two manifolds, a series of elements 63 formed by hollow flat rings held in suitably spaced position by hollow cross pieces 64 which connect them, to the manifolds 61 and 62 and place the inside of the rings 63 in communication with the inside of the manifolds 61 and 62. The space on the inside of the rings is closed at one end by a cover 65 fixed to the manifold 62, whereas at the other end a conduit 66 which is fixed to the manifold 61, places said space in communication with the outer air. Said conduit 66 has a cross-section which is substantially equal to the sum of the inlet cross-sections between the elements 63. Around the elements 63 and coaxially with them, are arranged other elements 67 formed by bodies of revolution the meridian of which is curved like the blade of a tuyere. The assembly of the elements forms the set of recuperator blades. At the inlet of the set of blades, each element 67 is hollow over a certain length and hollow cross pieces 64a, which maintain the spacing between said elements 67, places the inside of the hollow part of each set of blades in communication with the manifolds 61 and 62. Said set of blades is surrounded by a casing 68 which is extended so as to direct the air towards a second stage 69 having a second set of recuperator blades 70 enclosed in a casing 72 which exhausts the air. It is obvious that there may be any number of stages.

The radiator is mounted on an aircraft (Fig. 31) in such a manner that the conduit 66 opens towards the front and the air exhaust conduit at the outlet of the radiator preferably opens into a part of the aircraft which is subjected to a depression.

In the modification of Fig. 34, the air inlet conduit 66' of the radiator opens into a space enclosed between an upper manifold 61' and a lower manifold 62' and vertical cooling elements 63' which connect the manifolds 61' and 62' to each other and are arranged in two rows located at a certain distance from each other, on either side of and parallel with the axis of the conduit 66'; the elements 63' leave air circulation channels between them which are directed transversely to the axis of the conduit 66'.

Behind each row of elements 63' is arranged a set of recuperator blades 67' of which the elements are hollow over a part of their length and open into the manifolds 61' and 62' to serve likewise for the cooling. Sleeves 68' enclose the elements 63' and the set of recuperator blades 67'. As in the case of Fig. 31, a plurality of recuperator stages can be arranged in series.

Fig. 37 shows a construction wherein the whole surface of each element of the set of recuperator blades 67' serves for the cooling.

In the construction of Fig. 38, the set of recuperator blades 67b is formed of elements which are hollow over a certain length and which connect the manifolds 61b and 62b to each other, and there does not exist, in front of said set of blades, any non-recuperating elements which only have a thermic effect, as the elements 63 of the previous constructions.

In the example of Fig. 39 which relates to an air cooled engine, each cylinder 75 is surrounded with a deflecting jacket 76 which is connected

to an air inlet sleeve 77 and to a sleeve 78 for the outlet of said air. Suitable recuperator blades 79 are arranged inside the sleeve 78. In the case of a mixed air-water cooled engine, hollow blades 80 through which the liquid flows, can be arranged in front of the cylinder 75 and between the latter and the blades 79. The blades 80 can at the same time be recuperating blades.

The radiator of Fig. 40 shows the arrangement, inside the air inlet channel, of directing blades which overlap each other in the direction of flow and which are preferably carried by a frame 82 pivoting at 83, whereby the intensity of the cooling can be regulated.

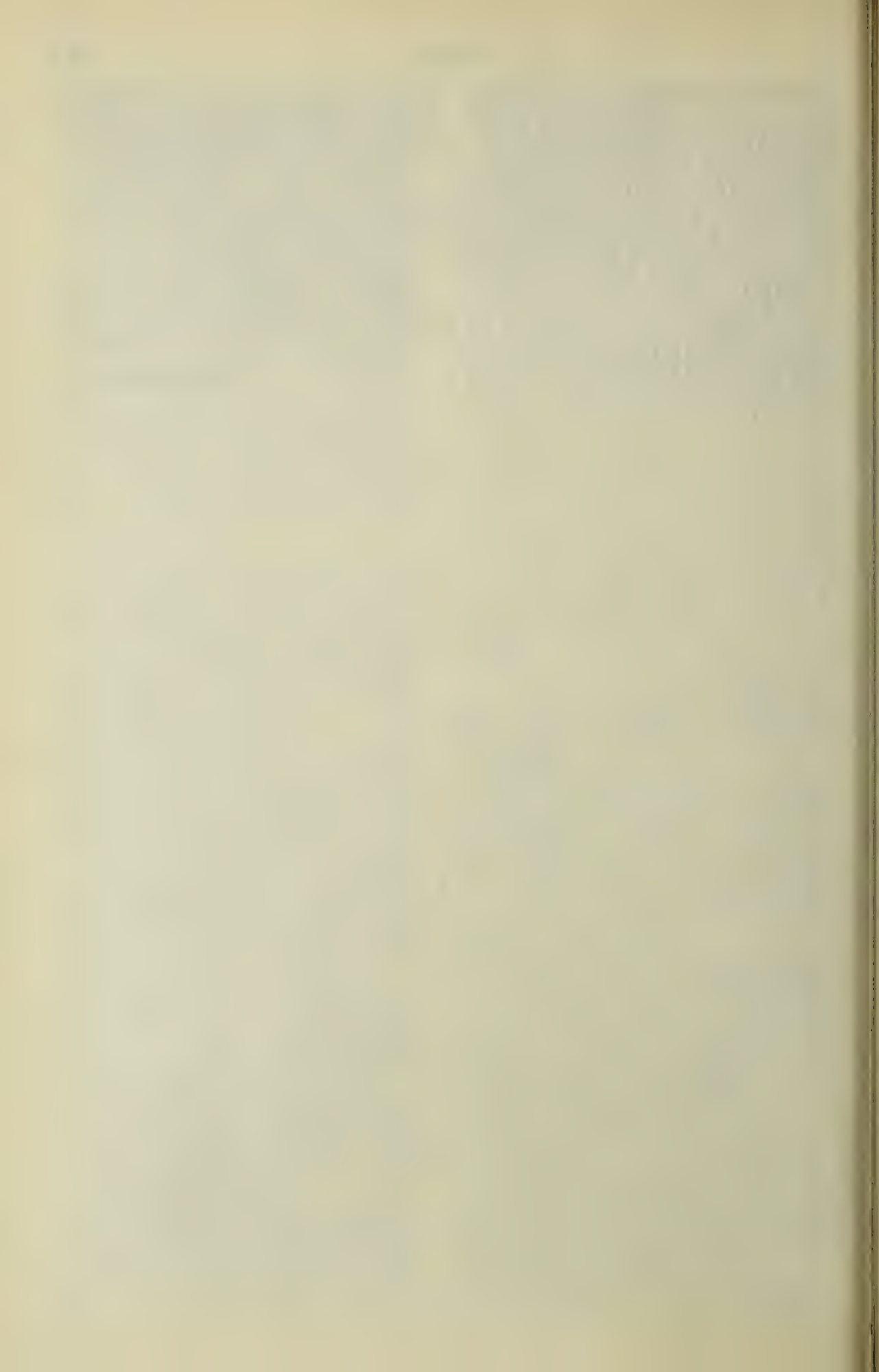
It will be noted that as all the elements are subjected to slight stresses, it is possible to make them of sheet metal or any other material. The whole arrangement can be very light and can be manufactured by the methods which are usual

in the manufacture of radiators. The elements can be round tubes with the ends flattened in the shape of blades, flat tubes, tubes of crescent-shaped cross section formed of differently curved metal sheets assembled by butt welding, etc.

In all cases the cross-sections of the blades are calculated according to the usual rules applied to turbines. If a plurality of successive sets of recuperator blades are provided, they can all be of the action or reaction type or some can be of one type and the others of the other type.

Of course, the invention is in no way limited to the details of construction illustrated or described, which have only been given by way of example. It is obvious that the arrangements described may be provided with any appropriate device for adjusting the passage cross-section.

GEORGES BOULET.



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7 Sheets-Sheet 1

Fig. 3

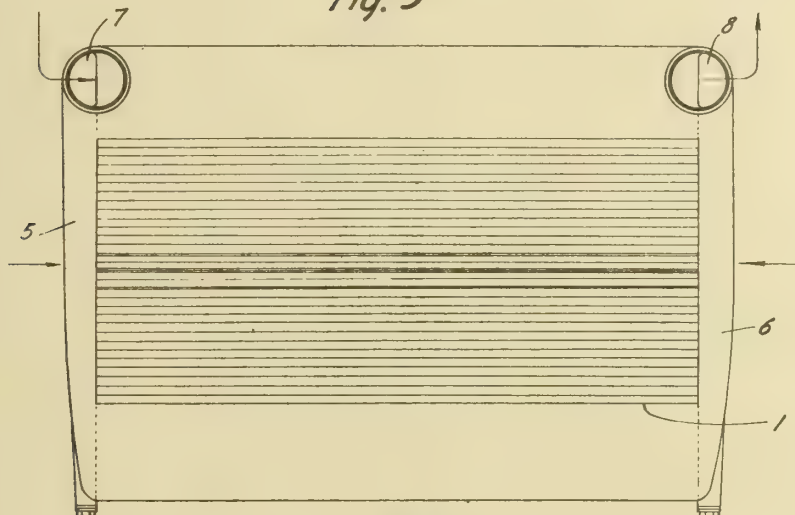


Fig. 1

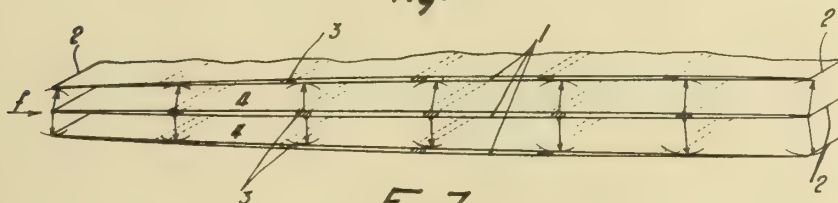


Fig. 7

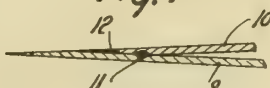


Fig. 5

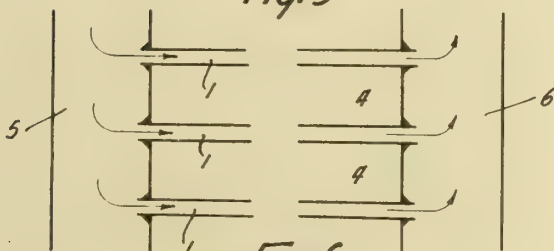
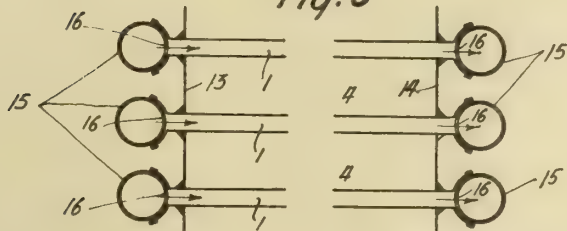


Fig. 6



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BY A. P. C.

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Filed April 18, 1940

Serial No.
330,429

7 Sheets-Sheet 2

Fig. 2

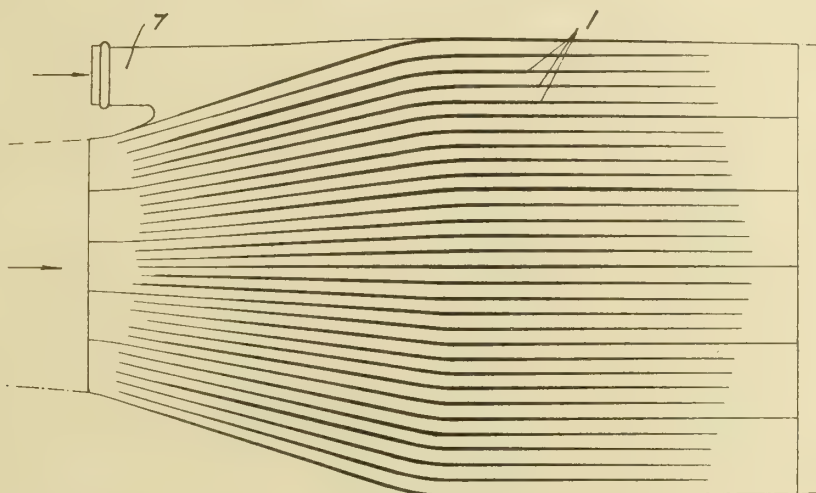
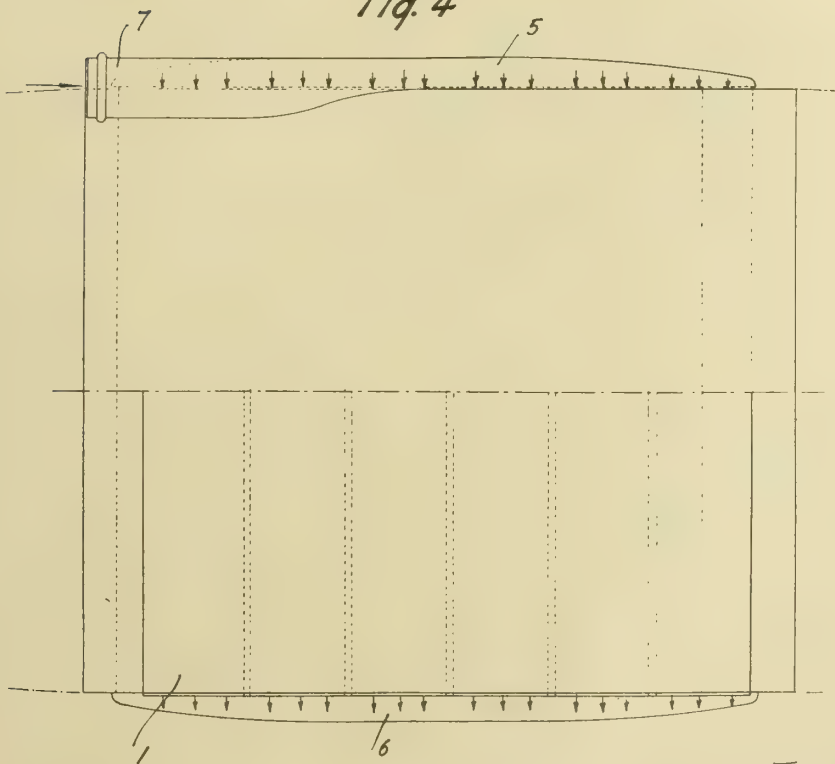


Fig. 4



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330,429

7 Sheets-Sheet 3

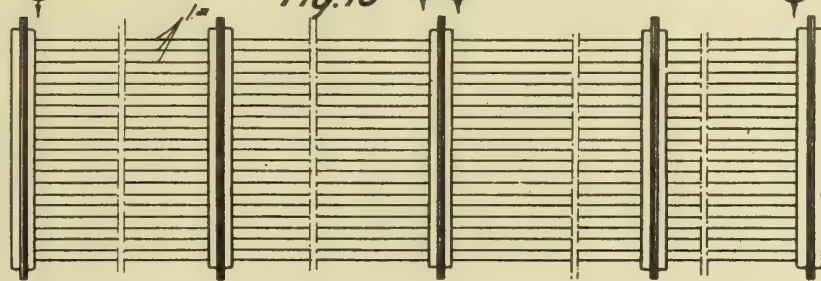
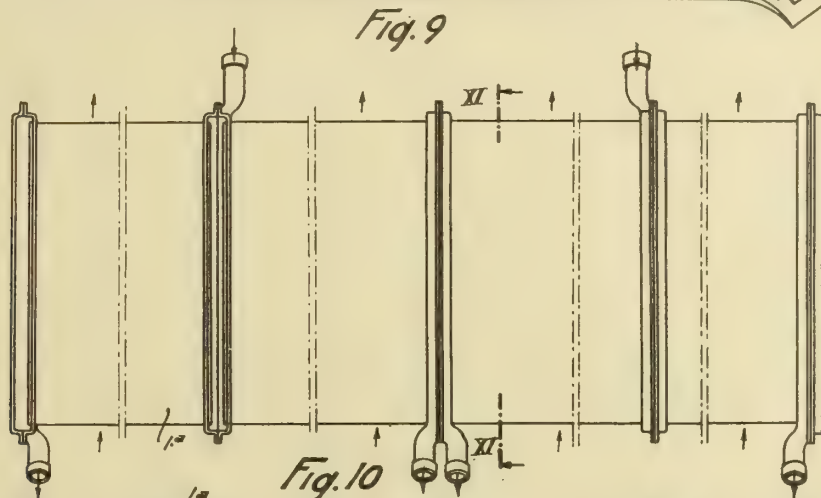
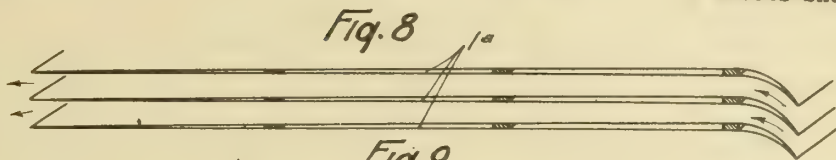


Fig. 11

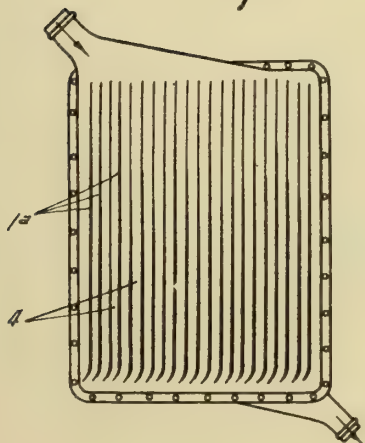
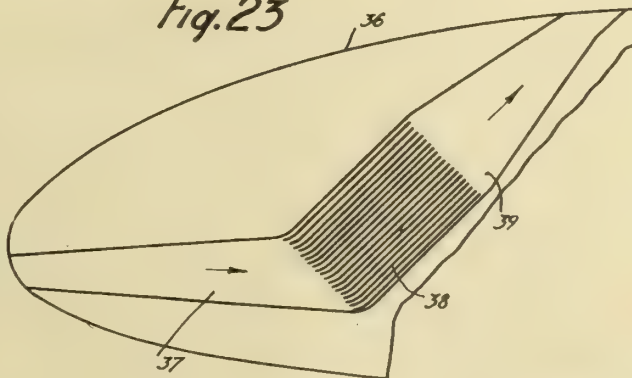


Fig. 23



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330,429
7 Sheets-Sheet 4

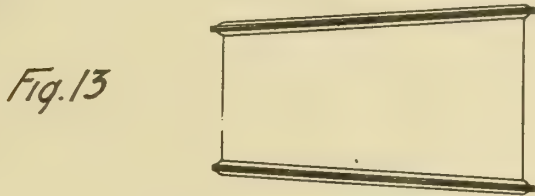
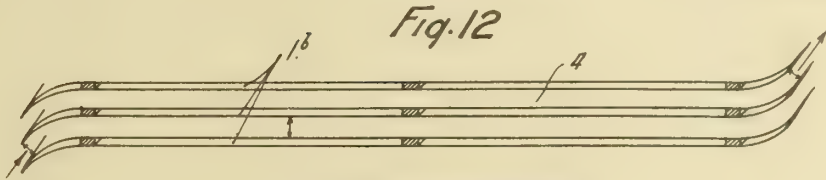
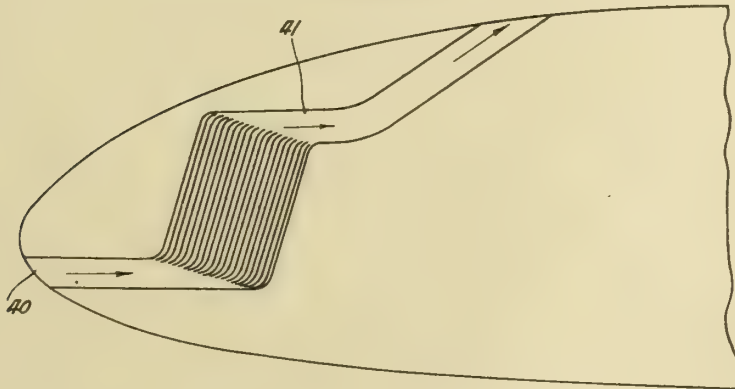
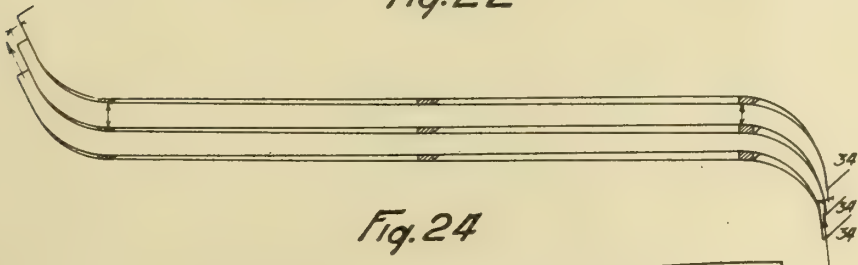
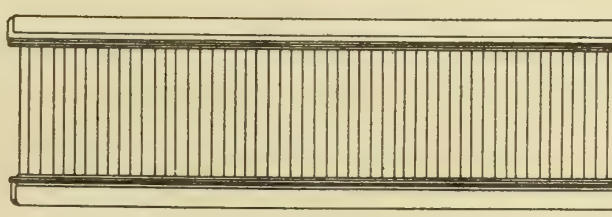
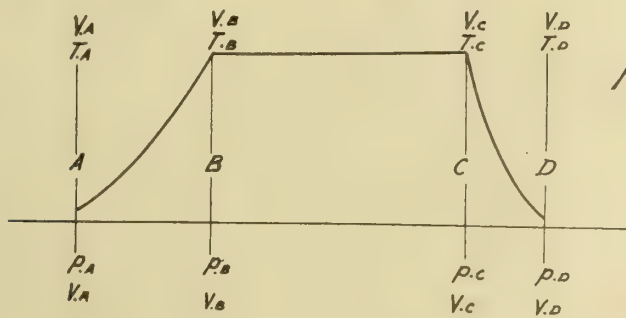
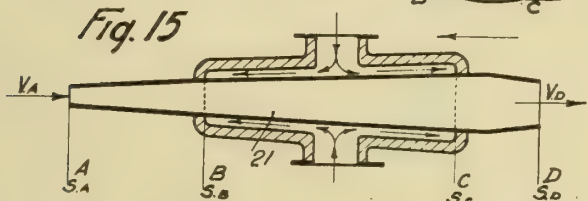
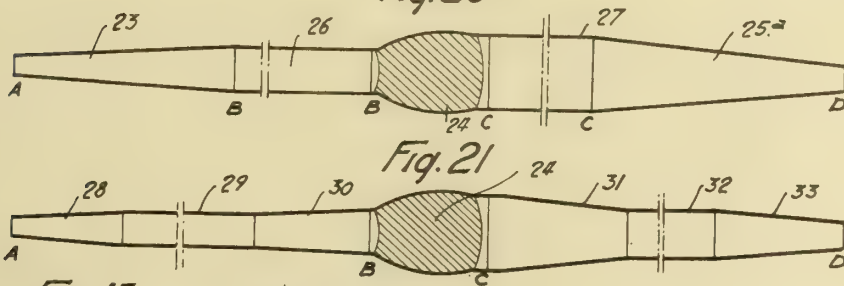
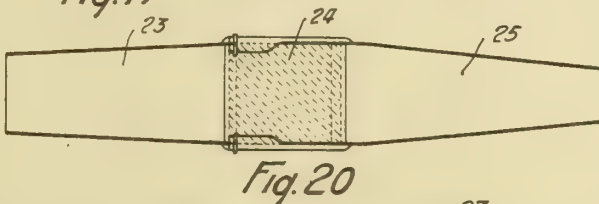
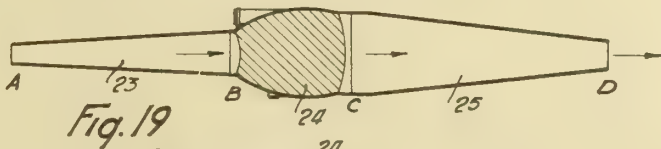
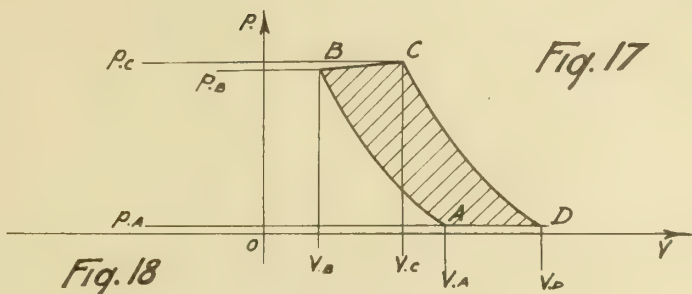


Fig. 14

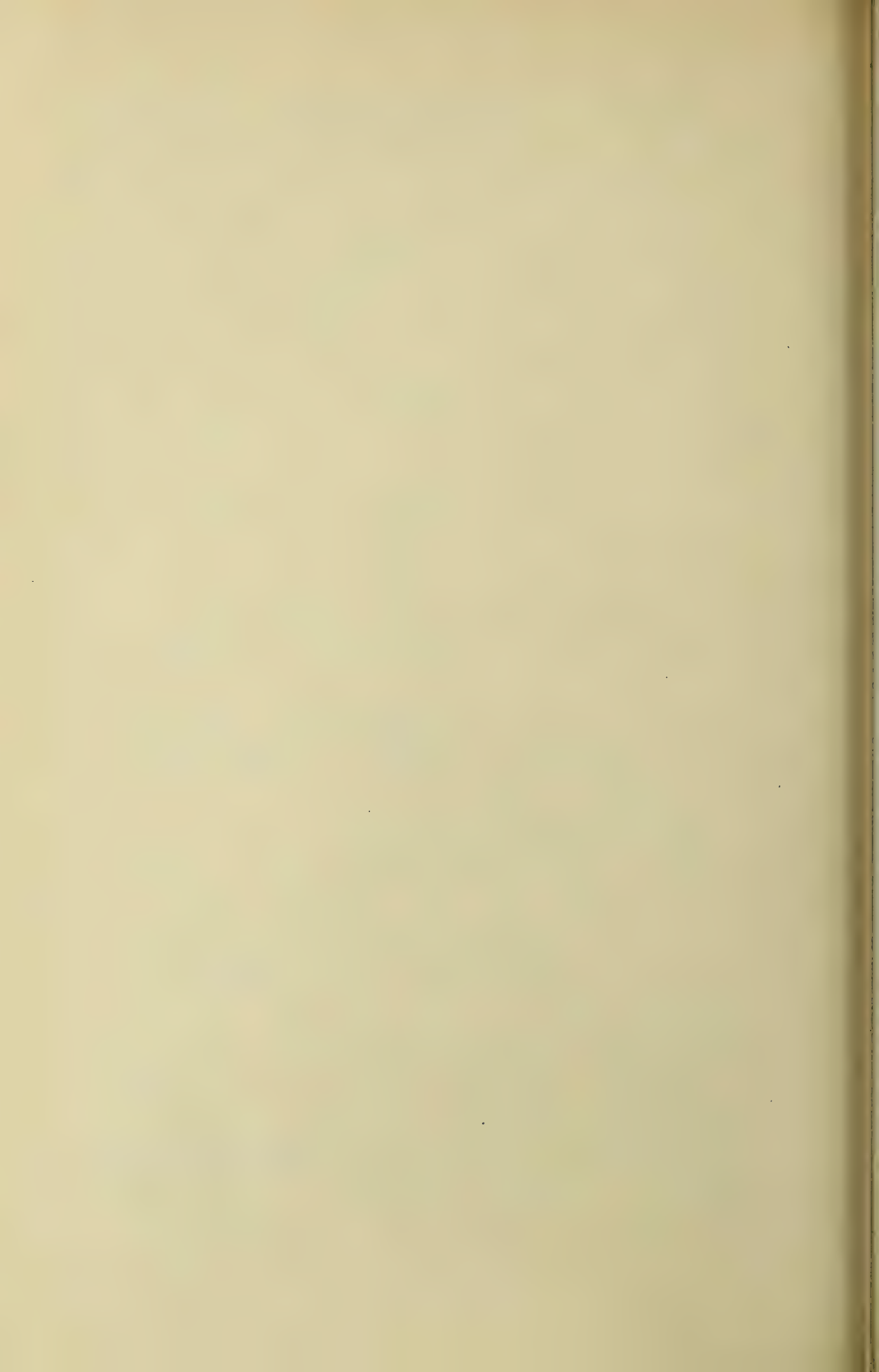


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Serial No.
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7 Sheets-Sheet 6

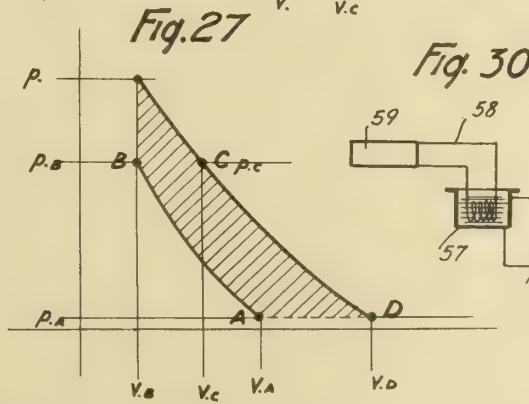
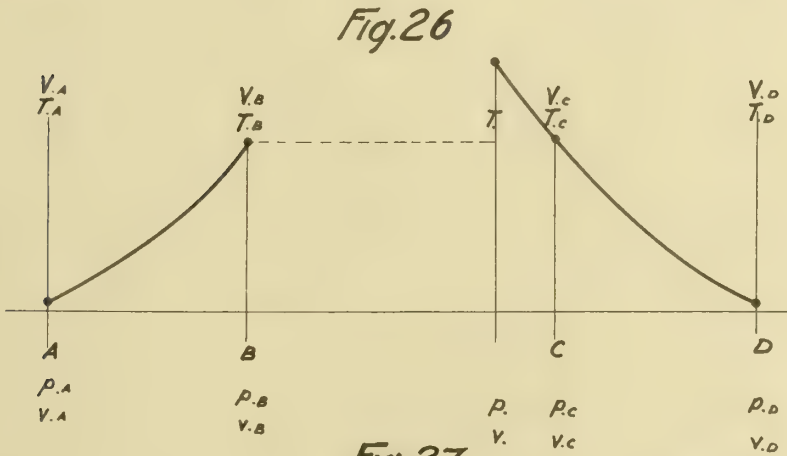
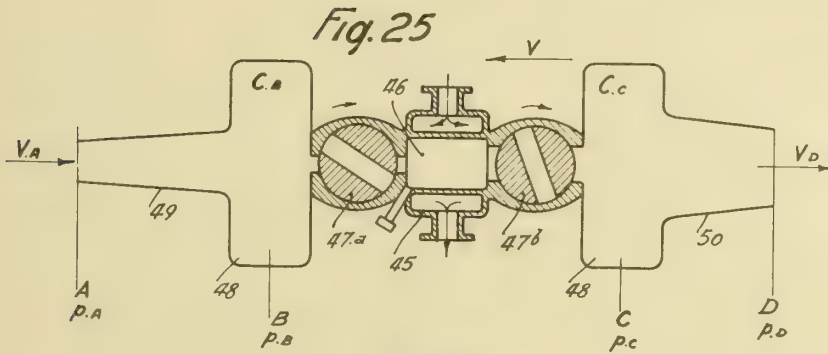


Fig. 28

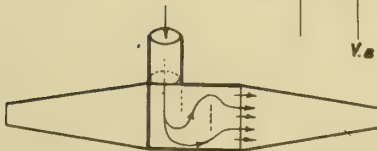
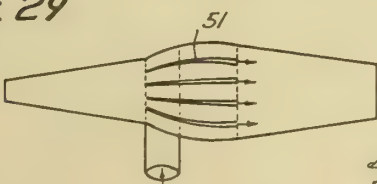


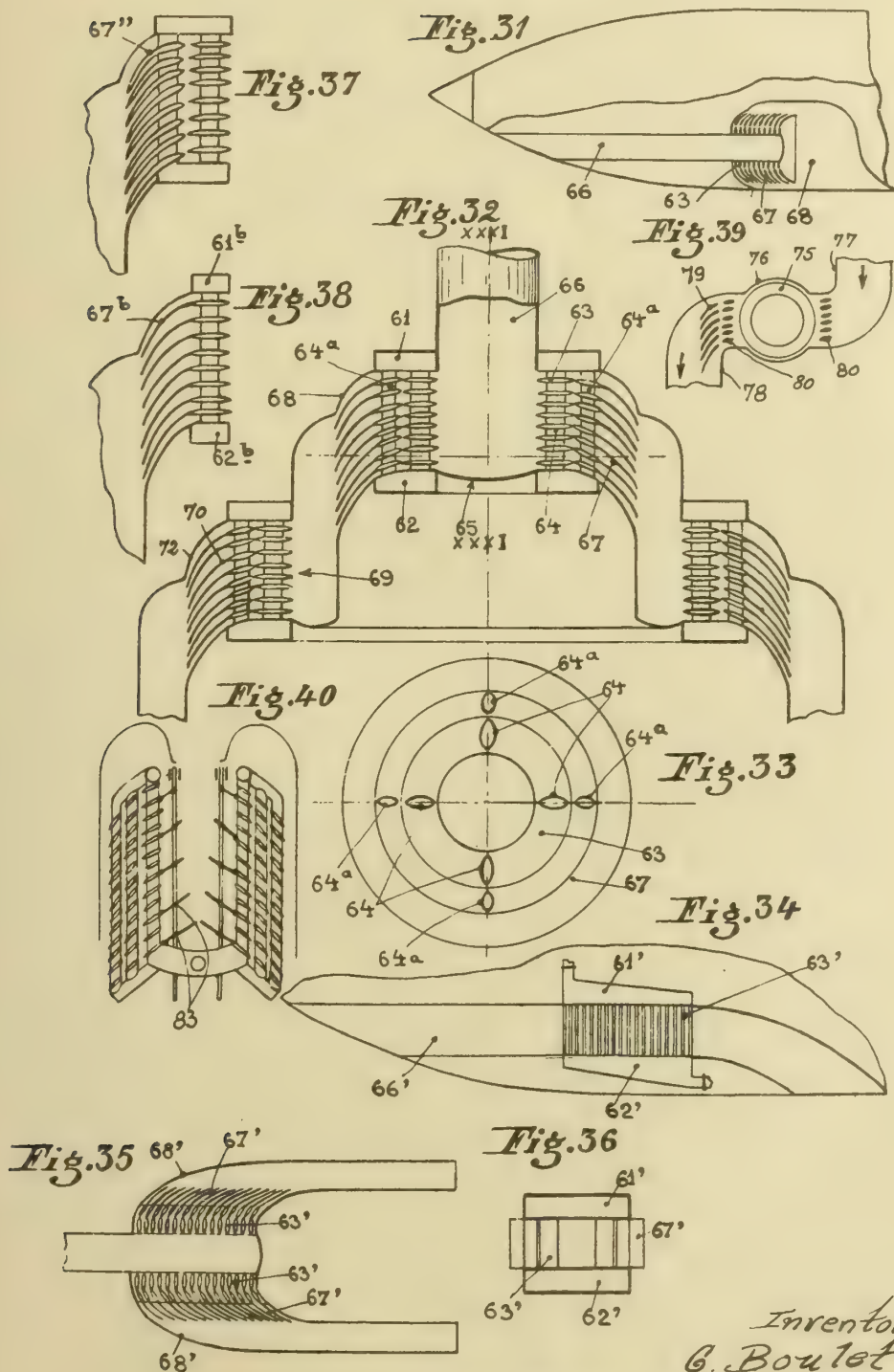
Fig. 29



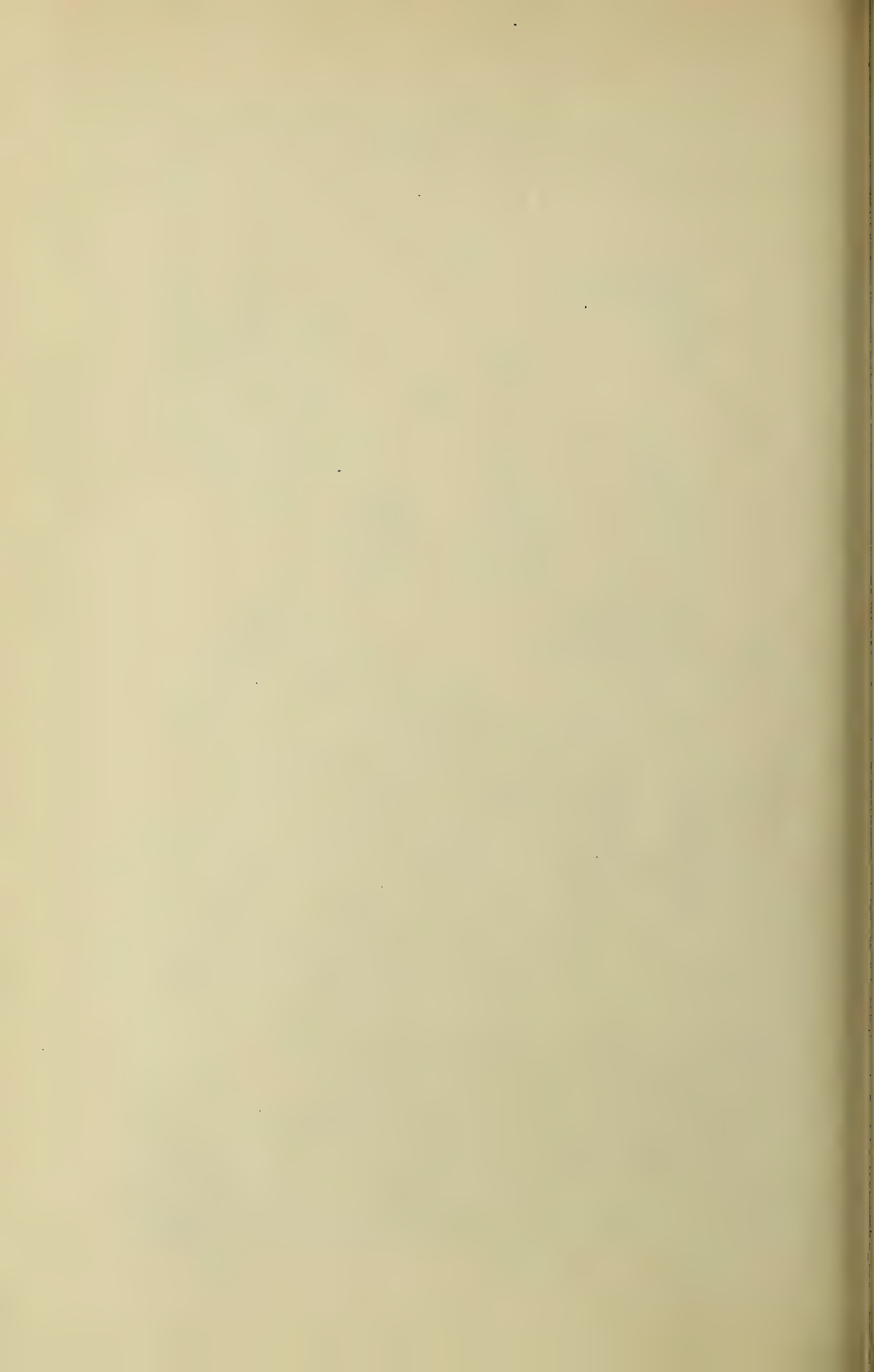
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G. Boulet

by Glascock Downing & Hubbs
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Inventor,
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ALIEN PROPERTY CUSTODIAN

EMBODIMENT IN THE PROCESS FOR MANUFACTURING ARTIFICIAL TEXTILE FIBRES FROM ANIMAL CASEIN

Antonio Ferretti, Milan, Italy; vested in the
Alien Property Custodian

No Drawing. Application filed April 20, 1940

The present invention has for its object an embodiment in the process for manufacturing artificial textile fibres from animal casein.

The process according to the invention includes (1) spinning filaments from an alkaline solution of animal casein by passing the solution through spinning dies immersed in a coagulating bath consisting of an aqueous solution of acid and soluble salts, the bath having a density above 1.180 (thousand hundred eighty) and a content of acid not less than the equivalent of 25 (twenty-five) grams of sulphuric acid per litre of bath, while the temperature is maintained not below 30° C. and (2) rendering the filaments insoluble in a bath of formaldehyde, to which soluble salts have been added.

The invention also includes (1) spinning filaments from an alkaline solution of casein by passing the solution through spinning nozzles immersed in a coagulating bath containing the residues of the coagulating baths employed in the manufacture of rayon from viscose (cellulose xanthogenate), said residues having a density above 1.180 (thousand hundred eighth) and an acid content not less than the equivalent of 25 grams of sulphuric acid per litre of bath, while the temperature is maintained not below 30° C. and (2) rendering the filaments insoluble in a bath of formaldehyde, to which soluble salts have been added.

The invention will be now explained with reference to the example of carrying out into practice.

In the factories which produce rayon by the viscose system (cellulose xanthogenate), a considerable quantity of residue from the coagulation bath is wasted. According to the present invention research has been conducted into the

possibility of employing this residue for the coagulation of the casein fibres. The residue is of a lower concentration than that in a normal coagulation bath, that is, it contains less acid and less sodium sulphate.

It has been found that said residue bath can be used provided that it has a density not below than 1.180 (thousand hundred eighty) and a sulphuric acid content not below than 25 (twenty five) grammes per litre of the bath. Uniform spinning of the alkaline solutions of casein is effected with such a bath, but the fibres stick to one another, thus rendering the product unserviceable, unless they are immediately immersed in a sodium chloride solution, to which preferably aluminium salts and formaldehyde have been added. Instead of sodium chloride, solutions of salts of alkaline metals or of alkaline earth metals could be applied; but the cost of the process would be increased, and the final product be of less value.

Other baths can be employed for the coagulation of the casein fibres, having a density not below than 1.180 (thousand hundred eighty) and a sulphuric acid content not below than 25 gr. (twentyfive) of sulphuric acid per litre of the bath, the sodium sulphate being replaced by other soluble sulphates or chlorides such as zinc sulphate, ammonium sulphate, ammonium chloride, etc. separately or mixed with one another.

The further particulars of the manufacturing process of the textile fibres of casein may be modified in various ways without departing from the spirit of the invention.

Of course the invention covers also the textile fibres of casein obtained by the indicated process.

ANTONIO FERRETTI.

ALIEN PROPERTY CUSTODIAN

EMBODIMENT IN THE PROCESS FOR MANUFACTURING ARTIFICIAL TEXTILE FIBRES FROM ANIMAL CASEIN

Antonio Ferretti, Milan, Italy; vested in the
Alien Property Custodian

No Drawing. Application filed April 20, 1940

The present invention has for its object an embodiment in the process for manufacturing artificial textile fibres from animal casein.

The process according to the invention includes (1) spinning filaments from a solution of animal casein and coagulating the same, in acid baths (2) collecting the coagulated filaments in a continuous strip and passing the same, under tension, through baths containing soluble salts, the hardened filaments being then cut to the desired length and dropped into a bath of formaldehyde, to which soluble salts have been added.

The invention includes also (1) spinning filaments from a solution of animal casein and coagulating the same in acid baths (2) collecting the coagulated filaments in a continuous strip and passing them, under tension, firstly through a bath of sodium chloride and then through a bath of aluminium salts and sodium chloride and eventually formaldehyde, the hardened filaments, being then cut to the desired length and dropped into a bath of formaldehyde, to which aluminium salts and sodium chloride have been added.

A further characteristic of the invention consists in the provision that the filaments, when issued from the coagulating bath are stretched and passed under tension through the successive hardening baths until they are cut to the desired length.

The invention will be now explained with reference to the example of carrying out into practice.

The casein fibre bundles which emerge from the spinning nozzles are conveyed to the top of the spinning machine, thus forming a continuous band of fibres (for instance one hundred spinning nozzles having one thousand holes each are equal to a band of one hundred thousand continuous fibres). This band is conveyed, under tension, first through a sodium chloride bath preferably in opposite direction to remove from the fibres, when desired all or part of the acid and the salts which are carried from the preceding coagulation bath; then the continuous band of fibres is conveyed, still under tension, through the preparatory bath for rendering the fibres insoluble, which is composed of sodium chloride and aluminium salts, together with or without the addition of formaldehyde, and when the fibres are sufficiently washed and subsequently hardened, the band is passed through an automatic cutter, which cuts the fibres to the desired length. The cut fibres, as

stated above, must be collected in a bath of sodium chloride or of other salts of alkaline metals or of alkaline earth metals, together with or without the addition of the aluminium salts and formaldehyde, but preferably in a bath for rendering them insoluble which is composed of an aqueous solution of sodium chloride, aluminium salts and formaldehyde.

The sodium chloride in the initial immersion bath may be replaced by other soluble salts of alkaline metals or of alkaline earth metals, but, in addition to the increased cost, the resultant product is not so good. Moreover by the use of a sodium chloride bath, this salt is conveyed by the fibre whose presence in the subsequent bath for rendering the fibres insoluble, is very useful and indeed almost indispensable.

The first immersion bath, for eliminating the acid and the sodium sulphate or other salts conveyed with the fibres from the coagulating bath, could also be omitted, when the said is immediately immersed in the preparatory bath for rendering the fibres insoluble composed of aluminium salts and sodium chloride or even directly into the complete bath for rendering the fibres insoluble composed of formaldehyde, aluminium salts and sodium chloride or of other soluble salts.

The band, which passes through the bath at the same speed as it is spun (60 to 80 metres per minute) may be continuously immersed in the above described baths, but it is also possible to immerse the said band intermittently, for example, at points located one metre apart, making it move upwards and downwards and vice versa so as to enter the bath even over a distance of 10 to 15 centimetres only of its travel, with a distance of one metre between successive immersion.

In this passage of the band of fibres through the above described baths it is important that the band be under tension when passing through the bath, namely that it cannot shrink for the action of the baths.

It is also important that the temperatures of the baths conveniently chosen.

The continuous or the intermittent immersing operation of the band is effected in less than five minutes (in conformity with the spinning velocity); the fibres are sufficiently hard to prevent adhering together (even when coagulation baths of low concentration are employed). The fibres could be cut to the desired lengths immediately and only shrink in so far as the best twist is to be obtained. If, however, a greater

twist is required, to the detriment of the fineness of the fibres, the passage of the band through the baths may be effected without maintaining it under tension.

By the above described treatment short fibres can also be derived from the casein which are finer than those which can be obtained during spinning. For instance, when the spinning operation is regulated so as to obtain a fibre the count of which is three denier and it is not possible to spin a finer number, the band of fibres should be drawn in one or more times with a speed which is 50% higher than that of the spinning velocity, and the count which during the spinning was three denier will be reduced to two denier. But when the band is then immediately cut, the fibres will shrink to a point at which the count has returned to three denier; instead, when the said band is made to pass through the above described baths, under tension and at the prescribed temperature the fibres will maintain the count of two denier.

In view of the fact that the price of wool increases as the count increases it will readily be appreciated that it is of considerable importance to be able to obtain a higher count without any increase in cost.

In order to avoid deterioration of the casein fibres when they are just coagulated, they should not be rendered insoluble in aqueous solutions which contain more or less high percentages of formaldehyde alone, but other salts such as sodium chloride and aluminium salts should be added to the aqueous solutions of formaldehyde.

The further particulars of the manufacture process of the textile fibres of casein may be modified in various ways without departing from the spirit of the invention.

The invention can also be applied to the manufacture of mixed fibres of casein and cellulose.

Of course the invention also covers the textile fibres of casein obtained by the indicated process.

ANTONIO FERRETTI.

ALIEN PROPERTY CUSTODIAN

EMBODIMENT IN THE PROCESS FOR MANUFACTURING ARTIFICIAL TEXTILE FIBRES FROM ANIMAL CASEIN

Antonio Ferretti, Milan, Italy; vested in the Alien Property Custodian

No Drawing. Application filed April 20, 1940

The present invention has for its object an embodiment in the process for manufacturing artificial textile fibres from animal casein.

The process according to the invention includes (1) spinning filaments from a solution of animal casein and coagulating the same in acid baths and (2) rendering the filaments insoluble at a temperature above 25° C (twenty five) and about 70° C (seventy) in bath of formaldehyde to which soluble salts have been added, to render the filaments boilingproof.

The invention includes also (1) spinning filaments from a solution of animal casein and coagulating the same in acid baths (2) hardening the coagulated filaments by passing them through baths containing soluble salts at a temperature above 25° C (twentyfive) and about 40° C and (3) cutting the hardened filaments to the desired length and then insolubilising the fibres at a temperature above 25° C and about 70° C in baths of formaldehyde to which soluble salts have been added.

Further, the invention includes (1) spinning filaments from a solution of animal casein and coagulating the same in acid baths (2) hardening the filaments by passing the same firstly through a bath of sodium chloride at a temperature above 25° C and about 40° C and then through a bath containing aluminium salts and sodium chloride at a temperature above 25° C and about 55° C and (3) cutting the hardened filaments to the desired length and insolubilising the fibres at a temperature above 25° C and about 70° C in baths of formaldehyde to which soluble salts have been added.

Further more the invention includes (1) spinning filaments from a solution of casein, coagulating the same, in acid baths, insolubilising the same at low temperatures and (2) treating the filaments insolubilised at low temperatures with solutions of formaldehyde at a temperature above 25° C and about 70° C to render the same boiling-proof.

The invention will be now explained with reference to the example of carrying out into practice.

In the manufacture of fibres of casein in which a first immersing bath for the filaments is provided, said first immersion bath for the filaments being composed of sodium chloride or other salts and a preparatory bath for rendering the fibres insoluble or a complete bath for rendering the fibre insoluble it is of great importance that the baths temperature be not below 25° C. The temperature must be preferably between 35° C and 40° C for the first bath of sodium chloride or other salts and between 50° C and 65° C for the preparatory bath for rendering the fibres insoluble, of aluminium salts, sodium chloride or for the complete bath for rendering the fibres insol-

uble of formaldehyde, aluminium salts and sodium chloride or other salts.

It is also important that the temperature in the bath, in which the fibres as soon as cut are introduced be not below 25° C, it being preferably to employ a temperature between the range 35° C to 40° C.

The treatment for rendering the casein fibres insoluble extends over a very long period, even several days, when carried out in a bath at ambient temperature, which is usually less than 25° C, nevertheless the fibres offer little resistance to boiling extending over a long period. On the contrary, it is found that when the temperature of the baths for rendering the fibres insoluble is raised for example to between 60° C and 70° C, perfect insolubility is obtained in less than nine hours, and the fibre which has been treated at that temperature completely resists boiling which may extend over many hours. Before proceeding to this strong treatment it is preferably to pass the fibres for some hours into the collecting bath of the cut fibres at a temperature of between 35° C and 40° C.

Complete resistance to the extensive boiling could also be obtained, when the casein fibres which have been rendered insoluble at a temperature which is lower than that indicated, for instance at 25° C to 50° C, are treated, preferably after being washed and dried, with an aqueous solution of formaldehyde at a temperature of about 60° C to 70° C for several hours, for example, five hours. In this case, the addition of the aluminium salts, of sodium chloride or of other soluble alkaline metal salts or earthy alkalies, to the formaldehyde solution, is unnecessary.

This treatment could be effected with the dried casein fibres at any desired time, that is to say, even after a period of many months or years from the manufacturing date of the fibre has elapsed.

Above all, it is of great importance that the treatment for rendering the fibres insoluble should be effected at temperatures which are not below 25° C, and that, when a temperature above 25° C, is applied, the relative operation should take place in an autoclave (digester) which should preferably be rotary, so as to maintain the fibres in motion while at the same time, the bath for rendering the fibres insoluble is made to circulate in the interior of the autoclave.

The further particulars of the manufacturing process of the textile fibres of casein may be modified in various ways without departing from the spirit of the invention.

The invention can also be applied to the manufacture of mixed fibres of casein and cellulose.

Of course the invention also covers the textile fibres of casein obtained by the indicated process.

ANTONIO FERRETTI.

THE HISTORY OF THE UNITED STATES

OF THE
NORTH AMERICAN CONTINENT
FROM THE FIRST DISCOVERY
TO THE PRESENT TIME

BY
JAMES OSGOOD
OF THE
MASSACHUSETTS BAR

IN TWO VOLUMES.
VOL. I.

NEW YORK:
PUBLISHED BY
J. OSGOOD & SONS,
155 NASSAU ST. N.Y.

1881.

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ALIEN PROPERTY CUSTODIAN

EMBODIMENT IN THE PROCESS FOR MANUFACTURING ARTIFICIAL TEXTILE FIBRES FROM ANIMAL CASEIN

Antonio Ferretti, Milan, Italy; vested in the Alien Property Custodian

No Drawing. Application filed April 20, 1940

The present invention has for its object an embodiment in the process for manufacturing artificial textile fibres from animal casein.

The process according to the invention includes (1) spinning filaments from a solution of casein, coagulating the same in acid baths, rendering them insoluble and (2) treating the insolubilised filaments with solutions of soluble phosphates.

The invention also includes (1) spinning filaments from a casein solution, coagulating the same in acid baths (2) hardening the filaments and cutting them to the desired length and (3) rendering the cut fibres insoluble and then treating the same with solution of soluble phosphates.

After the casein fibres have been rendered in-

soluble it is advantageous to treat them with aqueous solutions of monosodic, bisodic, or trisodic phosphate, together with or without the addition of formaldehyde, and this treatment should preferably be effected after the fibres have been dried.

The particulars of the process according to the invention may be modified in various way.

The invention can be also be applied to the manufacture of mixed fibres of casein and cellulose.

Of course the invention also covers the textile fibres of casein obtained by the indicated process.

ANTONIO FERRETTI.

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10

15

THE UNIVERSITY OF CHICAGO

CHICAGO, ILLINOIS

1890-1891

1890-1891

The University of Chicago was founded in 1837 as the first American university to be organized on the basis of the European model. It was the first American university to have a president, and the first American university to have a faculty. The university was founded by a group of men who were interested in the study of the liberal arts and sciences. They were interested in the study of the liberal arts and sciences because they believed that it was the only way to prepare men for the work of the world. The university was founded in 1837 as the first American university to be organized on the basis of the European model. It was the first American university to have a president, and the first American university to have a faculty. The university was founded by a group of men who were interested in the study of the liberal arts and sciences. They were interested in the study of the liberal arts and sciences because they believed that it was the only way to prepare men for the work of the world.

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ALIEN PROPERTY CUSTODIAN

CARDING MACHINES WITH DIRECT DRIVE

Hubert Duesberg, Brussels, Belgium; vested in
the Alien Property Custodian

Application filed April 24, 1940

The known sets of carders with automatic or semi-automatic drive are open to certain disadvantages, the most serious of which are in particular the following:

1. These sets require for their control the presence of a plurality of motors and couplings permitting sliding which give rise to high costs of installation and the occupation of a large amount of space.

2. These sets, which are frequently described as having "direct drive", have driving connections which comprise in particular belts, and therefore sources of slipping, which entails irregularities in feed and consequently errors in the yarn count.

3. When the desired yarn count is obtained, it is necessary, in order to obtain the optimum production, to modify the initial regulation of the inlet and outlet members of each of the machines of the set. Now, these modifications are effected by successive tests and it will readily be seen that when the production is obtained the initial yarn count may have been modified, especially in the case of high count, this being due to the fact that the initial ratios of transmission of the gears cannot be strictly maintained. Consequently, it is frequently necessary to effect multiple and sometimes empiric regulations, whereby considerable loss of time and production is entailed.

The arrangement according to this invention overcomes all these disadvantages owing to the fact that it only comprises for the entire drive a single point of application of the power, from which the driving of the various members is rigidly effected, and owing to the fact that the arrangement permits of modifying the initial production as desired by a single manipulation without changing the yarn count obtained, all the ratios of driving of the different inlet and outlet members being modified proportionally in each case.

The accompanying drawing shows diagrammatically a construction of the invention given by way of example and relating to a set of cards comprising three automatic machines having direct underneath drive.

The breaker card 2, the intermediate card 3 and the condenser card 4 are driven by a single electric motor 5, from a distributor 6. Extending from the latter are shafts such as 7 which drive the members of each of the aforesaid machines through the intermediary of flexible couplings shown diagrammatically at 8.

In cases where a set of the automatic type is

concerned, the drive of the carding devices of the condenser card 4 co-operates with an arrangement (train of gears) varying the production, which is shown diagrammatically at 9 and the purpose of which will hereinafter be defined. In cases where the set is of the semi-automatic type, this change-speed device is directly coupled with the shaft controlling the inlet and outlet members and fulfills in this type of set the same function as in the automatic type.

The arrangement for varying production drives in turn, through the intermediary of absolutely direct connections (pinions, shafts and the like), such as 10, the inlet and outlet members of the machines.

It is important to note that the arrangement according to the invention permits of rendering the operation of the set automatic, like that of a normal set, that is to say, one comprising independent machines.

In fact, in each of the rigid connections such as 12 controlling the inlet and outlet members from a general rigid connection 13, there is interposed a claw clutch 14 which permits, as desired and if the necessity arises, of placing any one or more of the cards in or out of the working circuit without momentarily influencing either the feed or the outlet.

In addition, the first two machines (2 and 3) may be maintained in operation although the condenser card is stopped.

For this purpose, the distributor 6 is placed in direct relation with the general connection 13 through the intermediary of the claw clutch 15, similar to 14.

Finally, according to the invention, the clutches 15 and 14 (condenser card) are interconnected, so that one alone may be the working phase.

The arrangement for varying production has the effect of modifying the initial production obtained, when the yarn count is attained and this without modifying the latter.

For this purpose, it is only necessary, after the initial regulation of each of the machines, to vary the ratio of transmission of the train of gears forming the arrangement for varying production, in order to modify automatically the initial production obtained. Since this production-varying arrangement drives all the inlet and outlet members of the machines, it will be understood that this modification of production is attained without varying the pre-established speed ratio of the inlet and outlet members of the machines of the set.

It will be understood that the invention also

covers the case of a normal set which would then be driven from a single localised motor having only one point of application.

It is also to be noted that in the case of a semi-automatic set, the flexible coupling of the condenser card is combined with a reversing arrangement permitting of reversing the direction of rotation of the cylinder of this machine, for example for the purpose of facing-up.

In the case of a normal set, each of the flexible couplings, that is to say each of the machines, is provided with a reversing arrangement of the aforesaid type, of which the operation is independent.

HUBERT DUESBERG.

PUBLISHED

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Serial No.

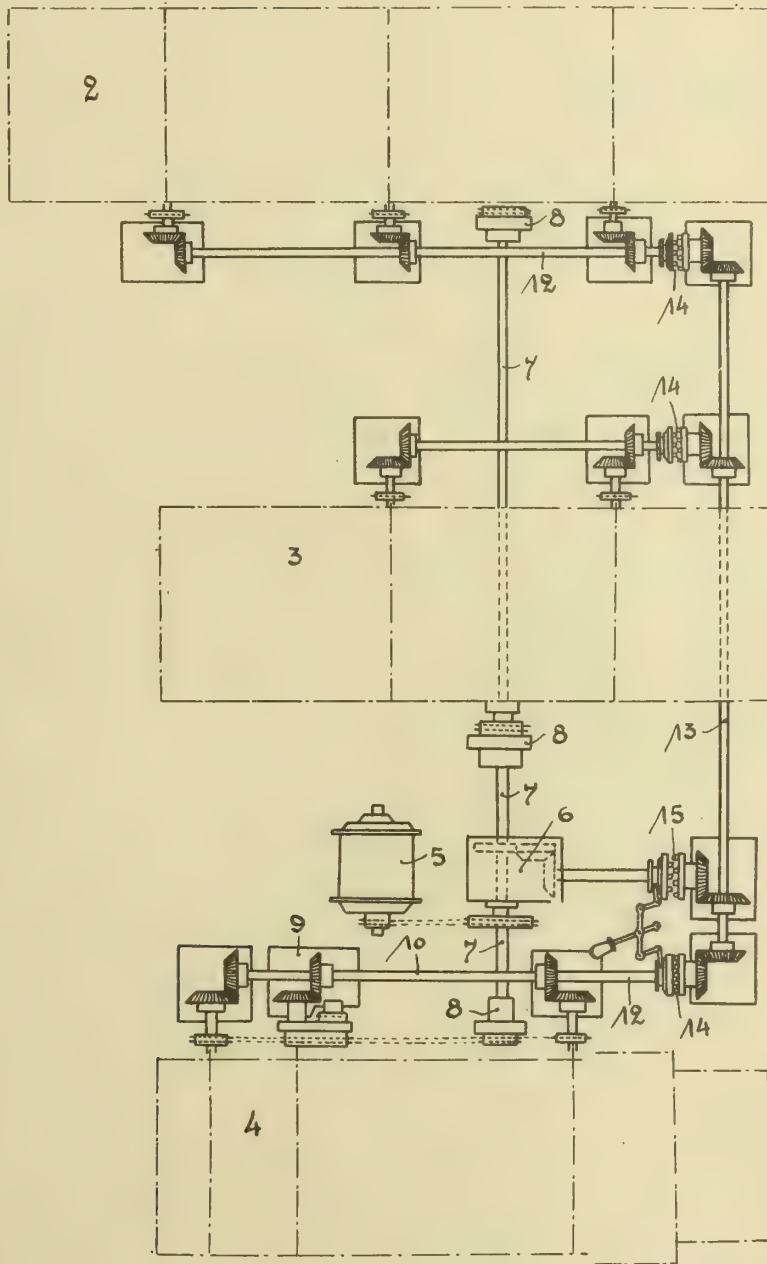
APRIL 27, 1943.

CARDING MACHINES WITH DIRECT DRIVE

331,471

BY A. P. C.

Filed April 24, 1940



INVENTOR

HUBERT DUESBERG

BY

Young, Emery & Thompson

ATTYS.

ALIEN PROPERTY CUSTODIAN

PROCEEDING FOR SUPERFICIAL COLOUR-
ING DECORATION BY MEANS OF COLOUR
TRANSPORT AND PENETRATION INTO
THE PORES OF VARIOUS BODIES

Giuseppe Tagliabue, Monza, Italy; vested in the
Alien Property Custodian

No Drawing. Application filed April 26, 1940

Object of the present invention form a pro-
ceeding for superficial decoration of even much
extended surfaces of different articles consist-
ing of materials having whatever characteristic
and presenting a porous body. This decoration
is obtained by incorporating into a superficial
layer of stones, textures, wood and other bodies
a colour, forming the desired drawing, and fix-
ing said colours in an indelible manner. The
proceeding according to the present invention
tends to remove the inconvenients of known pro-
ceedings essentially based on the simple super-
ficial adhesion of desired decoration carrying
films on the surface to be decorate and con-
sisting in the ticklishness of application works
and in the facility of stripping or rubbing away
the applicated decoration.

The proceeding according to the invention is
characterised by the fact, that the desired dec-
oration, composed eventually of some colours, is
previously printed on a sheet impermeable to
the employed colours and using melting fine
crushed colours mixed with fluid dissolving hy-
drocarbons—excluding aniline derivatives—with
20%-30% addition of transparent resin lique-
fiable on water-bath, which at the liquid state,
can penetrate into the pores of the materials
constituting the surface which is to be decorated
when the said sheet is applicated with its printed
face on the said surface previously moisted with
fluid hydrocarbons, whereafter one applies the
action of heat and pressure till the utilized resin
is melted.

At these conditions the melted resin and the
coloured mass tend to penetrate into the porous
superficial layer of the body to be decorated,
transferring in this layer without mixing of col-
ours and without decoration change.

The perfection of results which can be ob-
tained, depend on the suitable choice of resin to
be used and, above all, on the method for in-
troduce this resin into the colours utilized for

impression and transport. Excellent results was
obtained making use of colophony and similar
resins. This resin can be introduced into the
colouring pastes as a very fine powder, accurately
worked and amalgamated into the mass; more
perfect results can be however obtained dissolv-
ing by means of heating the resin in a fluid hy-
drocarbon, preferably of equal type as the hydro-
carbon utilized for colour melting, as can be
petrol and like. The resin solution in this man-
ner obtained is mixed with the colour suspension
in a manner to form homogenous mixtures of
very easy employ.

The sheets on which the decoration, is pre-
viously printed can consist in whatever material
suitable to receive the print without diffusion and
mixing of colours, but preferably one take sheets
which are naturally impermeable or impermea-
bilized in an adapted manner. The most perfect
result is obtained by plunging the sheets in pure
cellulose, containing resines solutions analogous
to the above-mentioned solution or, yet better,
utilizing the same resin and the same hydrocar-
bon. With this hydrocarbon one can moisten
the surface of body to be decorated, before ap-
plying the printed transport sheets.

The total extension of surface which can be
contemporaneously decorated is evidently limited
only by the possibility of printing proceeding,
which allow the printing of very long rolled sheets
having a considerable width. Some sheets can
be moreover easily jointed on his edges, giving
in this manner a possibility to decorate very ex-
tended surfaces with only one operation of col-
ours transport.

All particularities of execution of described
proceeding may be varied in accordance to the
particular conditions of surface to be decorated,
of chosen decoration type and of nature of uti-
lized colours; without departing of the scope of
present invention.

GIUSEPPE TAGLIABUE.

ALBANY ALBANY

ALBANY, N.Y., 1880-1881

ALBANY, N.Y., 1880-1881

ALBANY, N.Y., 1880-1881

ALBANY, N.Y., 1880-1881

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ALIEN PROPERTY CUSTODIAN

SWIMMING AND LIFE SAVING EQUIPMENTS

Raffaele Caselle, Rapolla, Italy; vested in the
Alien Property Custodian

Application filed April 27, 1940

The subject of the present invention relates to a life saving equipment formed of voluminous, water-resisting material capable of floating which is fitted in the manner of a cushion between two or more strips of water-proof fabric. The equipment is for protecting persons of every age, which make use thereof, not only from drowning but also against shocks, cold or other dangers which occur during distress at sea or when bathing.

It has been proposed to arrange the volume of the life saving appliance, capable of floating, not only in annular or belt form at the neck, around the chest or the body, which leads to an unstable, that is to say defective position of the centre of gravity of the swimming person, but also to distribute the same by means of a vest or jacket-like article of clothing, capable of floating, over the upper part of the body from the waist up to the neck. These known swimming vests, however, have the disadvantage that in order to obtain a satisfactory seating and not to move under the action of the waves, they must be produced according to measurements of the wearer, which is a very serious defect in connection with life saving appliances which are to be used on board ship or for a varying public at baths. A swimming vest which is not firmly connected to the body and does not bear snugly against the same consequently only constitutes, in the same way as a life belt, a defective protection.

In contrast the life saving equipment according to the invention is characterised in that it employs approximately an X-shaped swimming vest which by firmly tying and superimposing the weakly cushioned parts in the neighborhood of the waist can be connected closely to any adult human body and of which the increase of the cushioning which increases towards the neck ensures keeping the head out of the water and in particular ensures a stable position of the body in the water.

A further feature of the life saving equipment resides therein that two tying devices are provided which are attached to diametrically oppositely located points so that with every height of body there is always obtained a symmetrical distribution of the weight or upward driving force. The cushioned swimming vest is divided, in accordance with the invention, into three parts of which the middle part is preferably provided with horizontally extending sections, whilst the two outer parts located opposite one another consist of vertical sections extending conically towards the waist, whilst in all three parts the centre sections are cushioned to the greatest extent,

whilst the outermost sections are cushioned to the weakest extent. The swimming vest may, if desired, be provided with stronger cushioning on the chest than on the back, whereby the body assumes in the water a vertical but slightly rearwardly inclined position so that the mouth will be located high above the water level.

The swimming equipment according to the invention is adapted to be combined with different accessories varying according to different applications, as a swimming helmet, a parachute, a breathing device, ballast weights and a food container and these combinations form also part of the invention.

A number of forms of construction of the invention are shown by way of example in the accompanying drawings, wherein:

Fig. 1 shows a simple form of construction of the swimming vest according to the invention with similar chest and back portions.

Fig. 2 shows a form of construction with more strongly cushioned chest part and wherein the side parts, which are tied together at the front, are longer.

Fig. 3 shows a separate form of construction for divers and the crew of submarine with a breathing device and ballast weights.

Fig. 4 shows a separate form of construction for pilots who fly over the sea, with a parachute and securing straps.

Fig. 5 shows a folded swimming vest with the corresponding bag.

Fig. 6 shows a simple cushioned swimming and protecting helmet.

Fig. 7 shows a separate construction of a helmet and an ear protecting and breathing device.

Fig. 8 shows an auxiliary appliance (bag for foodstuffs with a cover).

Fig. 9 shows how the simple swimming vest in Fig. 1 can be worn (side parts of the chest portion are tied over those of the back portion).

Fig. 10 shows the application of the accessory appliance to a swimming equipment with a helmet according to Fig. 7.

Fig. 11 shows a separate equipment for divers according to Fig. 3 with a simple helmet according to Fig. 6.

Fig. 12 shows how the separate construction of the swimming equipment according to Fig. 4 can be worn (side parts of the back are drawn over those of the chest portion, securing straps in the crutch, swimming helmet according to Fig. 7).

In the simple form of construction of the swimming vest shown in Fig. 1, in which the chest and back portions are similarly constructed, so

that it is not possible for it to be worn the wrong way round, 1 indicates the opening through which the head is placed when the equipment is placed in position, 2 indicates the cushioned sections which cover the shoulders, chest and upper portions of the back. These sections, according to the invention, are provided with the maximum cushioning for the reasons set out above, and with the exception of the central part 2', extend parallel to the shoulders which facilitates applying the equipment by a bending from the chest, over the shoulders to the back.

The outer sections are far less cushioned, cushioning being reduced in all directions outwardly. The separate sections 3 are made slightly conical. 4 indicates the securing bands which are sewn to the inside of the conical sections or to their seams and when tied in pairs around the body press the swimming vest firmly against the body. At 5 are indicated two rings for securing a food container on the chest.

In the form of construction shown in Fig. 2 the sections 2'' on the chest are more strongly cushioned than the sections 6 on the back so that the swimming vest has a pronounced front of which the side parts are also shorter than those of the rear part which at the front bear against the body and are finally tied together. As mentioned, an inclined position of the body in the water is thus obtained so that the mouth is at a high level.

The separate construction for divers and for submarine crews, in Fig. 3, corresponds substantially with the form described with reference to Fig. 2 but with the difference that two central sections 7 are provided which are filled with a supply of air or oxygen and are connected together by a tube 8 so that an equal quantity of gas is withdrawn from both sections 7 through the breathing tube 8' and the positions of equilibrium remains undisturbed. The weights 9 are for the purpose of diving and for remaining some time under water, as also for enabling a slow rising in the water to be effected, without separate auxiliary appliances, whilst when the equipment is used for submarine crews they only serve this latter purpose and can be detached separately one after the other. Instead of the securing bands, belts 10 and buckles 10' are preferably used in this and other forms of construction. 11 indicates a mouthpiece with two short rubber tubules for the nose which permit of breathing under water through the mouth and nose.

The separate construction for pilots who fly over the sea, is provided in the back portion 12 with a recess for a parachute which is secured to the swimming vest by means of strong bands 13 and rings 14, but which otherwise is placed freely in the said non-cushioned recess, where it is prevented from falling out by a loose layer of fabric 15 and by two layers of fabric 17, capable of being drawn back in the manner of curtains by means of cords 16. Naturally instead of cords 16 there may also be provided a binding device for the parachute which opens automatically when jumping off. In this construction the pilot jumps off over water with the parachute, wearing the swimming vest secured to the parachute as described, the vest being held in position by strong bands 18 and 18', sewn to the interior of the swimming vest, and which pass through the rings 14 and when put on pass under the arm-pits, whilst the ends 19 and 19' are passed cross-wise under the crutch and are then connected together. The weight of the person thus acts

substantially as a pull on the upper limbs. After the pilot, who has jumped off, has reached the surface of the water, he releases himself from the parachute by opening a spring catch hook which connects the parachute to the band system 13. The construction of the cushion is different in this example in so far as it extends throughout and the opposite sides thereof are connected together at spaced intervals.

As shown in Fig. 5 the division of the swimming vest, according to the invention, into three main parts enables it to be folded together easily and tied by means of the extending bands and inserted conveniently into a bag 20.

The simple helmet shown in Fig. 6 has the feature that by a strong cushioning of the rear sections 2', both at the head and neck parts of the helmet, it facilitates remaining a long time in the water in the back position with the head raised out of the water.

The helmet shown in Fig. 7 differs from that shown in Fig. 6 by cheek and ear protectors, as also by the provision of an air supply in the head part 22 of the helmet. This supply serves, on the one hand, for a few moments of submersion and is withdrawn through a tube 23, but this air container 22 serves mainly to withdraw breathing air from a point located at a higher level above the water level, whilst the valve 24 serves to prevent water from entering the container 22 and the mouth.

The food storage container 25 shown in Fig. 8 consists of a cushioned frame into the recesses of which there are fitted flasks 26 and boxes 27, beverages, medicines, signals and food. The button fasteners 5' are connected to the rings 5 of the vest. For adapting the cushioning of the swimming vest, which becomes thicker towards the neck, more effectively, the parts 25 located in the vicinity of the waist are not only made thicker than the parts 25'' located in the vicinity of the neck, but the containers are made to conform with the varying thickness. The cushioning of the frame balances the additional weight of the containers. A sleeve 28 with a slot 29, capable of being buttoned, prevents the containers from falling out of the frame 25. It is itself secured to the frame 25 by buttons 30.

From Figs. 9 to 12, showing the swimming equipment as worn, there is shown particularly clearly how the volume increases conically, from the waist towards the shoulders and Figs. 11 and 12 show how the ballast weights are arranged for convenient detachment and equally distributed around the waist zone.

In its various combinations with a swimming helmet, a parachute, a breathing device, ballast weights and a food container, the life saving equipment according to the invention affords for the first time a complete protecting for the various persons by whom it is worn under different circumstances when remaining in the water for a length of time.

The known arrangements, such as life belts and so forth are in no way suitable for being combined with these additional protecting and life saving appliances, but it is only the construction of the swimming vest according to the invention which firmly embraces and protects the upper part of the body and which ensures a satisfactory location of the centre of gravity of the body in the water whilst ensuring absolute freedom of movement of the limbs, which makes this combination possible.

RAFFAELE CASELLE.

Fig. 1

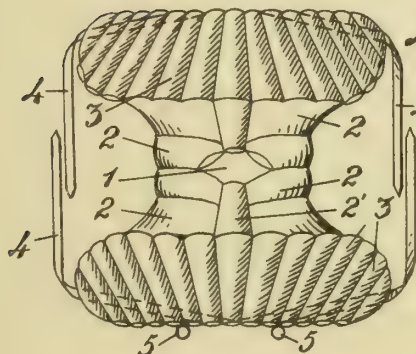


Fig. 2

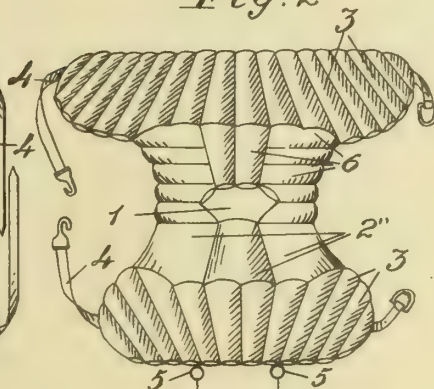


Fig. 5

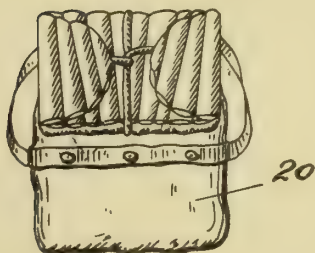


Fig. 8

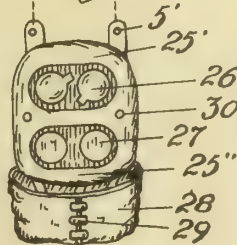


Fig. 9

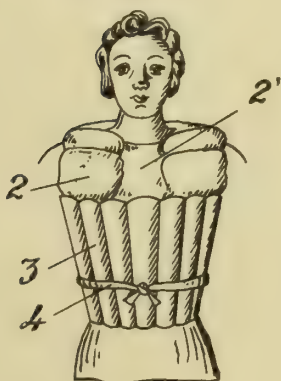
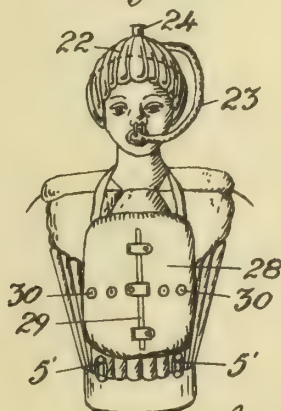
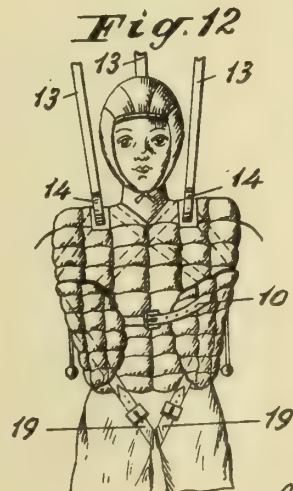
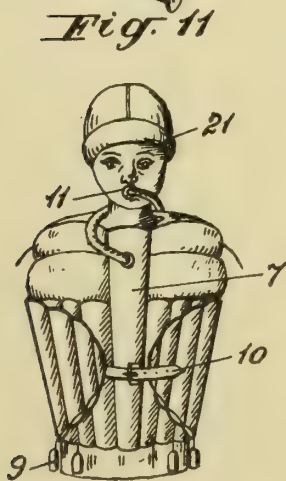
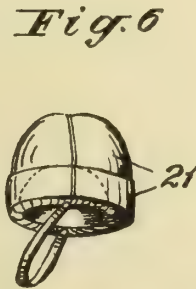
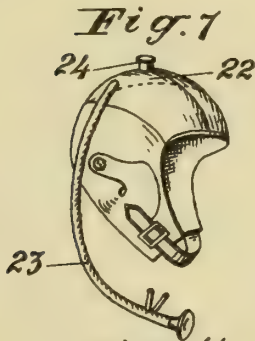
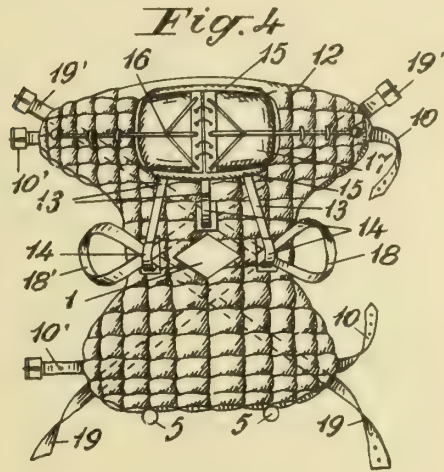
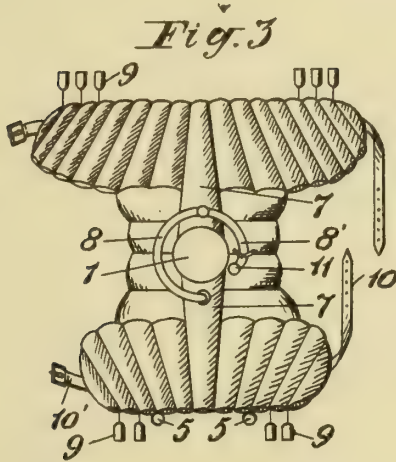


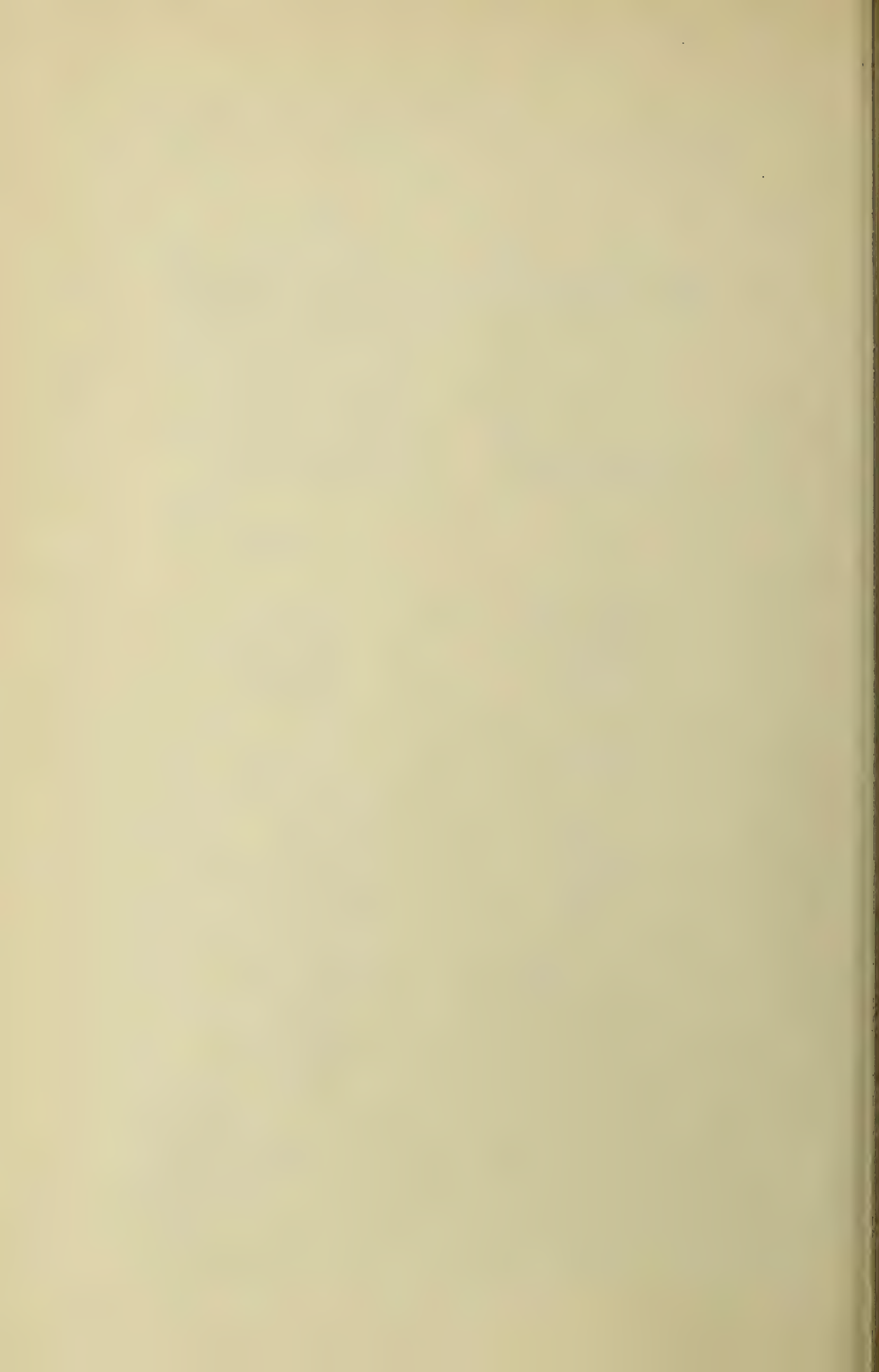
Fig. 10



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ALIEN PROPERTY CUSTODIAN

PROCESS OF PREPARING POLYPHOSPHATES AND POLYPHOSPHATE MIXTURES

Karl Rudolf Andress, Erlangen, and Karl Wüst, Darmstadt-Eberstadt, Germany; vested in the Alien Property Custodian

No Drawing. Application filed May 4, 1940

This invention relates to a new process of preparing polyphosphates and polyphosphate mixtures, characterized by heating the initial components to temperatures essentially beyond the melting temperature with subsequent sudden cooling.

It is well known that polyphosphate of the composition of $\text{Na}_5\text{P}_3\text{O}_{10}$ is forming by slowly cooling adequate melts. Moreover, it can be obtained, among other polymeric phosphates, as described in literature by Gmelin (Handbuch der anorganischen Chemie, 8th edition, volume 21) by heating $\text{Na}_3\text{HP}_2\text{O}_7$ up to 300°C .

The above method, however, is not applicable in industrial preparation (manufacturing on a large scale), where pure polyphosphates of homogeneous character must be obtained in good yields. Therefore different propositions for the manufacture of polyphosphates have been made, partly trying to solve the problem in that manner, that according to the principle of slow cooling they provide a period of tempering of about 5 hours, and partly following the method known from literature, according to which transformation of pyrophosphate into tripolyphosphate is effected by starting from the lower limit of temperature—that is by heating pyrophosphate to 300°C .

The mentioned methods are all not practical and not economical, since they comprise several processes, require complicated apparatus, and above all absorb much heat for tempering. Besides, if good yields shall be realized, continuous working is rendered very difficult, because in this case very long tempering is necessary.

All these processes base on the principle of displacing by tempering the equilibrium of the melting components below the melting point in favour of tripolyphosphate.

We have found another way, being essentially more economical and delivering polymeric phosphates in a better yield. This way comprises heating the melting mass considerably over the melting point, viz. to temperatures situated at least 150° or more beyond the melting point of the reacting mass, and suddenly cooling the molten mass. If for example a mixture of 1 gramme-molecule of metaphosphate and 1 gramme-molecule of pyrophosphate is smelting at 600°C , the reacting components have to be heated to 750°C

or 1050°C with immediate cooling to 500°C . In this way are—contrary to the known methods—in a single process always obtained from a melting mass of certain stoichiometrical composition homogeneous polymeric phosphates, having—according to the proportion of the initial components—either homogeneous character, or representing mixtures of different polymeric phosphates. The products forming according to the present invention have an excellent calcium-binding power; they are completely water-soluble, and can without any difficulty be manufactured continually, as tempering now is superfluous.

Example 1.—306 g of sodium metaphosphate and 266 g of sodium pyrophosphate are mixed and heated up to 750°C . Then the molten mass is rapidly cooled by sprinkling or by passing it in a thin layer upon cooling rollers, the speed of rotation being chosen so that the reacting bodies are cooled below 500°C within a few seconds. Thus, an amorphous powder with excellent lime-binding and lime-dissolving power is obtained, the composition of which corresponds to that of sodium pentapolyphosphate.

An especially advantageous form of execution of the present process in the case of low-polymeric phosphates, such as tripolyphosphate, consists in suddenly cooling the molten mass from 1050°C to about 610°C only, and then interrupting cooling, so that the temperature range from 610°C to 550°C is passed slowly. While, when cooling the mass below 500°C , products are forming, the lime-binding power of which corresponds to 88% of $\text{Na}_5\text{P}_3\text{O}_{10}$ and about 3% of $(\text{NaPO}_3)_6$, the yield of $\text{Na}_5\text{P}_3\text{O}_{10}$ is raised to about 100%, if cooling time is regulated so that for passing the range from 610°C to 550°C 10 minutes are necessitated.

Example 2.—100 parts of weight of sodium metaphosphate and 260 parts of weight of sodium pyrophosphate are molten in the electric furnace at 1050°C until equilibrium is reached, whereupon the mass is suddenly cooled to about 600°C or 620°C by means of cooling rollers or in a similar way. Then cooling is interrupted and the mass, in layers of 2 cm of thickness, is left to itself. The so-gained product is completely water-soluble and has an excellent calcium-binding power.

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ALIEN PROPERTY CUSTODIAN

PROCESS AND APPARATUS FOR THE CONTINUOUS PRODUCTION OF CORRUGATED GLASS SHEETS

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Application filed May 4, 1940

United States Patent No. 2,122,083 issued June 28, 1938 relates to a method of and apparatus for the continuous manufacture of corrugated glass sheets, which may be reinforced or not, the production of which consists in passing a continuous sheet over a fixed shaping member which is corrugated transversely. The continuous sheet is preliminarily flat, and at the moment it comes in contact with the shaping member it has a temperature sufficiently high, and is thus sufficiently plastic, to assume the corrugated form of the shaping member by reason of its own weight.

The above mentioned patent describes various means for complementing the action of the weight of the sheet, particularly for the parts of the sheet designed to form the lower parts of the corrugations, and for this purpose there are provided counter-shaping members acting on the top of the sheet and forcing it to come in contact with all parts of the shaping member, and particularly the lowermost parts thereof. In one embodiment specifically disclosed in this patent the counter-shaper is disposed to act only on the bottoms of the corrugations.

After its passage over the shaping plate the corrugated sheet is carried by rollers of the ordinary type, generally cylindrical, on which it is carried into an annealing oven and cooled to the surrounding temperature. The arrangement is such that the time of the passage of the sheet over the shaping member is of sufficient duration so that the same will not come in contact with the rollers before having acquired sufficient rigidity to exclude the danger of its becoming deformed when it is deprived of the support of the shaping member. In order to provide the required duration of passage necessary to obtaining hardening, that is, sufficient cooling, of the sheet, the shaping member is thus given a certain length, chiefly in the interval which, on the shaping member, separates the point at which the sheet receives the desired corrugated form, and the exit from the shaping member. It has been found in practice, particularly in the case of reinforced or wire glass, that during this interval the corrugated sheet may run the risk of deformation, due particularly to the fact that this sheet, which is not yet hard, is subject to traction through entraining or conveying members acting on the cold part of the previously formed sheet.

The present application consists in providing a method and means suitable for maintaining the form of the sheet constant during its passage over the shaping member, particularly from

the moment in which it has received the desired corrugated form.

One embodiment of the present invention consists in disposing above the shaping member and the sheet a counter-member exerting action over a great length of the sheet to a point where it has become practically rigid. As this prolonged action tends to increase the friction between the sheet and the fixed parts, the shaping member and the counter-member do not contact with the sheet at points opposite each other, so that the shaping member and counter-member do not exert simultaneous action on the same points of the glass and thus do not, by combining their action, risk wedging or jamming the sheet. These two members may each have a transverse profile or cross sectional form which is constant from the entrance to the exit, but in this case the profile of the one is combined or arranged with that of the other so that the upper semi-corrugations of the sheet in one transverse section are separated from the counter-member and are in contact with the shaping member, while the lower semi-corrugations are, on the other hand, separated from the shaping member and in contact with the counter-member.

In the drawings illustrating the features of the invention, Fig. 1 is a vertical longitudinal section of one embodiment of the invention;

Fig. 2 is a partial transverse section along line 2—2 of Fig. 1;

Fig. 3 is a vertical longitudinal section of another embodiment of the invention;

Fig. 4 is a vertical longitudinal section of a third embodiment of the invention; and

Fig. 5 is a plan view of a variation of the embodiment of the invention illustrated in Fig. 4.

In Figs. 1 and 2 of the accompanying drawing is shown an embodiment of the invention by way of example. The continuous glass sheet 1, obtained in known manner, by passage of the glass from a furnace 2 in a rolling mill 3, passes over the shaping member 4. The latter consists of a metal table the upper part of which is formed of corrugations having a general direction parallel with the direction in which the sheet moves. This table forms caissons 5 in which water is circulated to regulate the temperature.

Disposed above this table is a counter-mold 6 which is integral with supports 8, with which the height may be varied and which is provided preferably with caissons 7 in which water is circulated. This counter-mold comprises corrugations parallel with the direction in which the sheet moves and the pitch of which is equal to

that of the corrugations of the shaping member, which latter are arranged with respect to those of the shaping member as shown in Fig. 2. As seen in this figure the upper semi corrugations or ridges 1a of the sheet are in contact with the shaping member 4 and removed from the counter-member. The lower semi-corrugations or grooves 1b of the sheet, on the contrary, are in contact with the counter-mold 6 and removed from the shaping member. Through the action thereby exerted on the lower semi-corrugations, the counter-mold holds the upper semi-corrugations in contact with the corresponding parts of the shaping member, and vice versa, the action of the shaping member on the upper semi-corrugations is sufficient to hold the lower semi-corrugations of the sheet in contact with the corresponding parts of the counter-mold. The result is that the combined action of the two members is suitable for maintaining the profile of the sheet constant. However, the shaping member and the counter-mold must be so arranged that they do not act as a drawing die and that the glass sheet does not fill the whole space therebetween in order not to create an excessive amount of friction, which would necessitate an excessive pulling force to overcome this friction. Such a pulling would tend to make the glass sheet thinner, and in the case of reinforced glass would operate to alter the shape of the wire mesh. By arranging the corrugations in the shaping member and the counter-mold so that these make alternate contacts with the opposite faces of the sheet, a gentle gradual forming action is realized without occasioning large frictional resistance requiring strong pulling forces, as in the case of a drawing die.

In the embodiment shown in Figs. 1 and 2 the counter-mold extends over the greater portion of the length of the shaping member and assures the retention of the profile during the greater part of the passage of the sheet.

According to modifications of this arrangement the counter-mold, constructed like that described and embodied in its whole for the entire extent of the shaping member, may, however, be composed of a plurality of different elements disposed either successively or side by side accordingly as the counter-mold may be subdivided longitudinally or transversely relative to the advance of the sheet. These different elements may be regulated individually.

According to another embodiment of the invention the glass sheet is subject to the action of balls resting on the sheet, rotating freely on themselves and acting in the bottom of the corrugations. Fig. 3 shows such a construction. The balls are shown at 9 and their travel with the sheet is prevented by the abutments 10. These balls act on the sheet by their own weight and hold it in contact with the bottom of the corrugations or grooves of the shaping member. These balls may have a radius approximating that of the corrugations of the shaping member, so as to exert their action over a large portion of the grooves of the sheet.

It is to be noted that the balls act independently of each other and can thus describe rotational movements different from each other. This is of advantage in cases in which all points of the sheet do not move at the same rate of speed or, for example, where the shaping member, as a

result of unequal expansion, has certain local deformations or warping or where the sheet itself presents differences of temperatures from one longitudinal line to another and the sheet does not cool in the same manner from one point to another of each cross-sectional line thereof.

According to the invention it is also possible to combine the counter-mold with balls. Use may be made, for example, of an arrangement such as that shown on Fig. 4, in which the glass sheet is first subjected to the action of a counter-mold 6, then to the action of balls 9. Instead of this arrangement the sheet may first pass under balls then under a counter-mold.

Counter-molds may also be combined with balls so that the arrangement differs from one corrugation to the next. This arrangement permits particularly of taking into account any differences of temperature or consistency of the sheet from one corrugation to the other. Fig. 5 shows such a construction by way of example. In this arrangement, the glass sheet is first subjected to the action of a counter-mold 6, then to a series of aligned balls 9, fitted with abutments 10, as shown in Figs. 3 and 4. Following these molding stages, each of the outside grooves is subjected to action of a ball 9 and a counter-mold 6 while the inner groove is subjected to the action of only the balls 9.

It is to be understood that the invention is not limited to the above described constructions, but may include numerous modifications. Particularly, if the form of the corrugations differs substantially from the semi-cylindrical form, the balls may be replaced by rollers of suitable profile for the lower semi-corrugations or grooves and exerting their action through their own weight and independently of the others.

Summary

The addition relates to a method and apparatus for the continuous production of corrugated glass sheets described in the principal patent, and comprises means adapted to hold the profile of the glass sheet constant during its passage over the shaping member.

These means are characterized specifically by the following features, separately or combined:

(a) A counter-mold which exerts its action over a great length of the sheet and practically until it passes from the shaping member, is disposed above the shaping member and the sheet.

(b) The shaping member and the counter-mold associated therewith each have a constant transverse profile, but that of the one is associated with that of the other so that, in the same cross-section, the upper semi-corrugations of the sheet are removed from the counter-mold and in contact with the shaping member while the lower semi-corrugations are removed from the shaping member and in contact with the counter-mold.

(c) The counter-mold is formed of a plurality of different, individually regulable, elements.

(d) The sheet is held on the shaping member by balls resting on the sheet and rotating freely on themselves, the travel of said balls with said sheet being prevented by means such as abutments (stops, etc.) for example.

(e) According to a modification counter-molds are combined with balls.

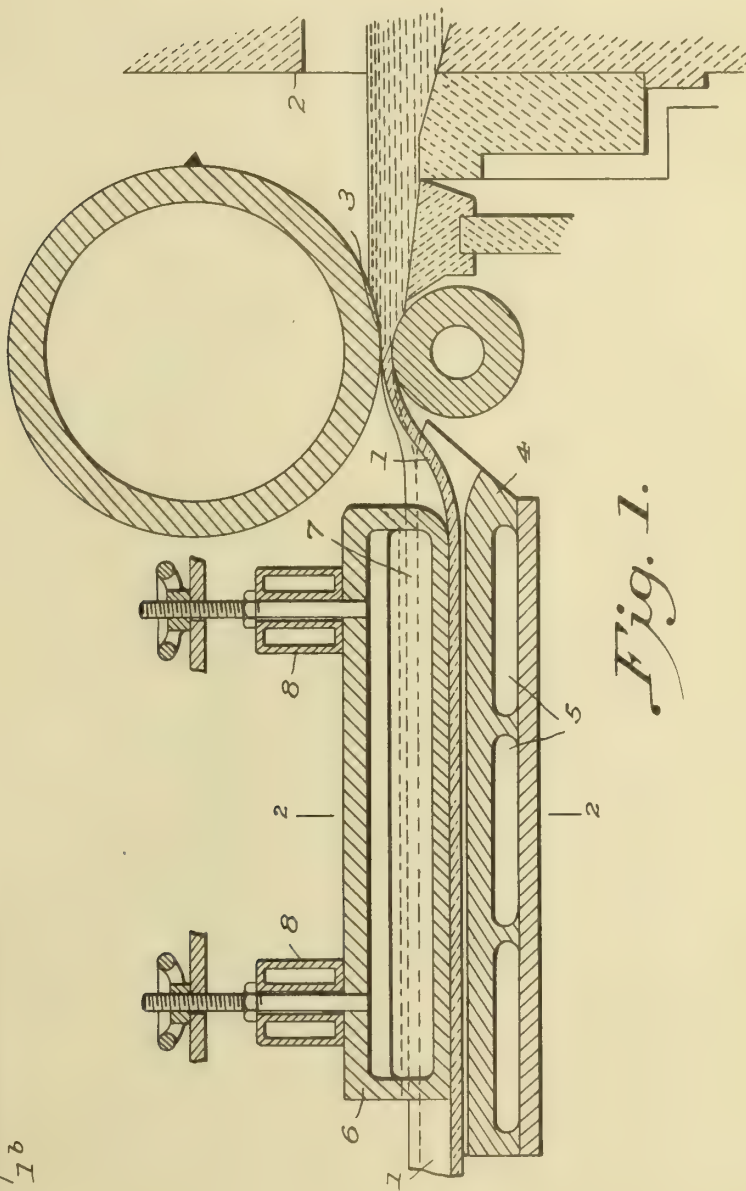
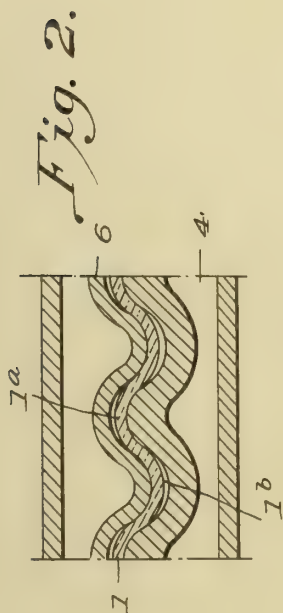
LOUIS BOUDIN.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

L. BOUDIN
PROCESS AND APPARATUS FOR THE CONTINUOUS
PRODUCTION OF CORRUGATED GLASS SHEETS
Filed May 4, 1940

Serial No.
333,410

3 Sheets-Sheet 1



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L. BOUDIN
PROCESS AND APPARATUS FOR THE CONTINUOUS
PRODUCTION OF CORRUGATED GLASS SHEETS
Filed May 4, 1940

Serial No.
333,410

3 Sheets-Sheet 2

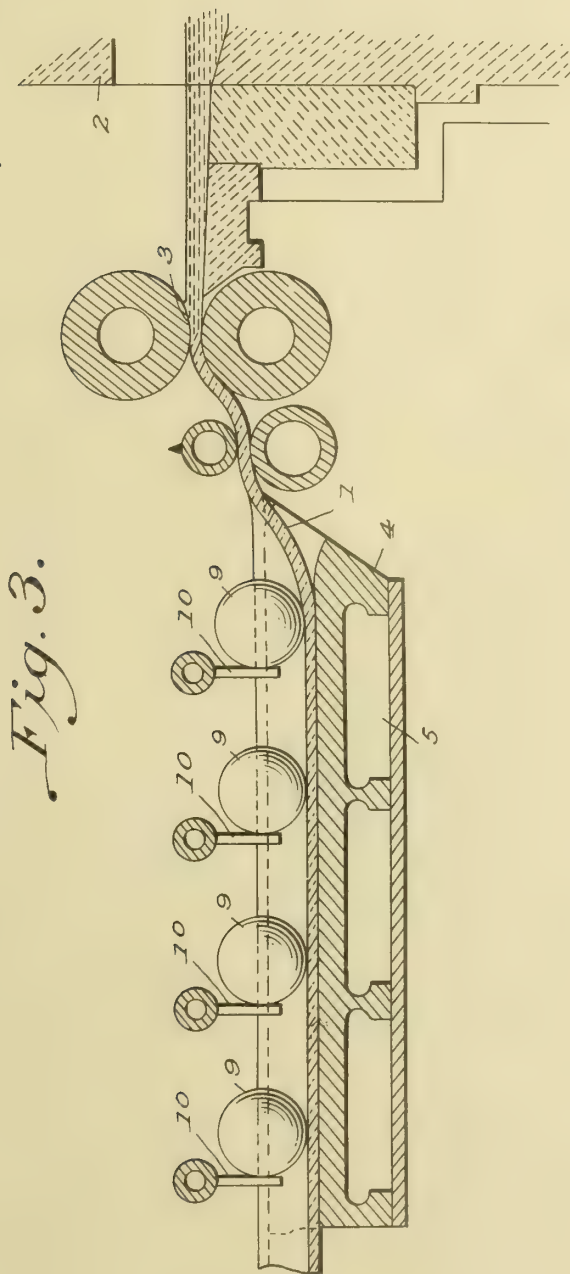


Fig. 3.

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3 Sheets-Sheet 3

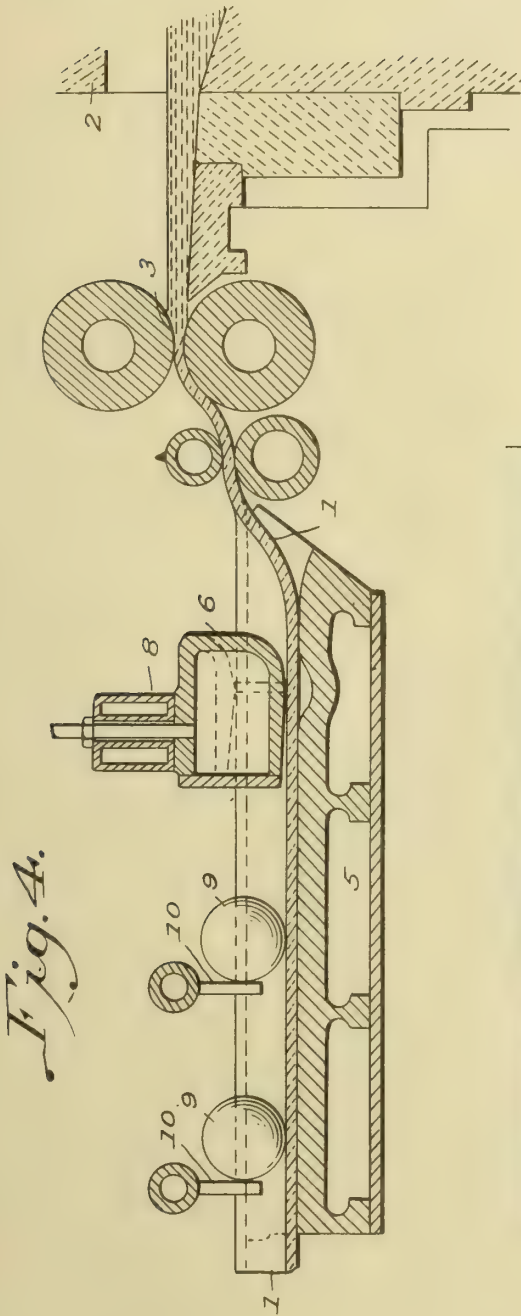


Fig. 4.

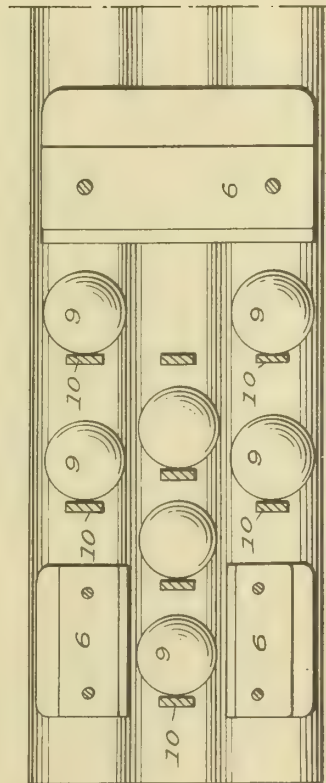


Fig. 5.

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ALIEN PROPERTY CUSTODIAN

DEVICES FOR REGULATING THE TEMPERATURE OF ELECTRIC FURNACES OF THE RESISTANCE TYPE

Erwin Pierre Jung, Paris, France; vested in the Alien Property Custodian

Application filed May 11, 1940

In the electric furnaces of the resistance type, use is generally made of devices adapted for automatically cutting off the current from the heating devices when the desired temperature is attained at a given point in the furnace, and for again supplying the current when the temperature at this point again becomes reduced.

The arrangement which consists in selecting the place for taking the temperature at a point near the pieces or objects which are to be heated in the furnace at a given temperature, is well known and in current use, but although the temperature of the pieces is thus exactly regulated, the temperature of the heating devices is fixed only between this lower limit and an upper limit which depends upon the conditions of transmission of heat in the furnace between the heating devices and the pieces to be heated.

For this reason, the temperature variations of the heating devices of the furnace may often reach considerable values, and chiefly, for instance, when a protecting screen of refractory ceramic material is placed between the pieces to be heated and the heating devices of the furnace.

When the temperature is very high and is near the maximum admissible limit for a given alloy of which the heating devices of the furnace are made, any great and frequent changes of temperature will hasten the oxidizing of the alloy, and this latter will also be damaged.

In order to obviate this drawback, the place of taking the regulating temperature is sometimes selected at a point near the heating devices, whose operating temperature is thus fixed in a definite manner. This arrangement will provide for the maximum life of the heating devices, but it will not give any exact indication of the temperature of the pieces or objects to be heated, and the condition of thermal equilibrium between these pieces and the heating devices of the furnace requires a long time to establish. Accordingly, this method is only used in practice for continuous furnaces or for furnaces whose temperature is to be kept up for a long time.

The object of the apparatus according to the invention is to obviate the above-mentioned drawbacks.

For this purpose, and in conformity to the invention, use is made of two devices for taking the temperature, such as pyro-electric couples, one of which is placed near the pieces to be heated, and the other near the heating devices, as well as an external apparatus which is adapted to reduce, according to the temperature of the pieces and according to a predetermined formula, the maxi-

mum temperature which can be attained by the heating devices of the furnace, and the regulating of the temperature of the furnace is effected upon these latter.

This will provide for a very small temperature variation in the heating devices, and this will practically depend only upon the sensitiveness of the regulating pyrometer, while the difference of temperature between the heating devices and the pieces to be heated, which is a maximum at the start, will tend towards zero according as the pieces become heated.

According to one feature of the invention, use is made of two pyro-electric couples which take the temperature respectively at the heating devices and at the pieces to be heated, and which act upon two separate pyrometers, which might in fact be assembled in a single instrument. The furnace is regulated by the pyrometer used for the heating devices, which is arranged as a regulator. The pyrometer for the pieces to be heated will modify, by mechanical means acting upon the regulating part of the pyrometer for the heating devices, the temperature for which the temperature regulator comes into action, according to a predetermined formula, depending upon the measured temperature of the pieces.

In another feature of the invention, the two pyrometers are quite independent from a mechanical point of view, and the pyrometer for the pieces will modify the regulating of a potentiometer whose difference of potential is determined according to a given formula, depending upon the temperature of the pieces. The couple which shows, in units of electromotive force, the temperature of the parts, is connected in series with this potentiometer, and the regulating pyrometer measured the sum of these two values.

According to another feature of the invention, only a single pyrometer is employed, using as the formula for the temperature variations of the heating devices, the formula for the variations of the electromotive force of the couple showing the temperature of the pieces to be heated. These two couples, having the same characteristics, are connected in series, and the regulator measures the sum of the electromotive forces of these two couples.

According to another feature of the invention, the above-mentioned device is completed by a pyrometer for temperature regulation which is separately controlled by the couple showing the temperature of the pieces to be heated, in such manner that for a given temperature of said pieces, the regulation made upon the two couples

is cut off, and then restored if the temperature of the pieces becomes lowered. This is carried out by a series connection between two controlling contacts actuated by the two regulators, and the current supplied to the heating devices will depend upon the closing of these two contacts.

For the better understanding of the manner in which the invention may be carried into effect, reference is made to the accompanying drawing which shows a constructional form of a pyrometric device comprising two pyro-élevtric couples connectes in parallel.

The two couples *a* and *b* are located respectively near the pieces and the heating devices.

The said couples are connected in parallel through two resistances A and B, for a given position of the hand-operated or automatic switch C.

A leakage resistance R is connected to the terminals of the combination of the couple *b* and the resistance B.

The pyro-electric regulator P measures the difference of potential at the terminals of the resistance R, or at the terminals of the couple *a* alone, according to the position of the switch C, and when it operates, it opens or closes the circuit of the heating devices by its action upon the distant-control switch I.

The operating point of the regulator corresponds to the measurement, by the pyrometer, of the electromotive force produced by the couple *a* alone when the pieces are at the proper temperature, i. e., when the regulating pointer is placed, on the pyrometer scale, at the proper temperature to be obtained for the pieces.

The different ohmic resistances of the parts of the circuit are such that the regulator will operate, during the measurement made upon the two coupled together, when the temperature of the heating devices attains the maximum determined by the chosen regulating formula, while the regulating pointer remains in the position above mentioned.

If *E* and *E'* are the electromotive forces produced by the respective couples *a* and *b*, and *E*₁ the electromotive force of the couple *a* corresponding to the adjustment of the regulator, the formula for regulation has the form:

$$E' = E_1 + KE_1 + p(E_1 - E)$$

The values of the two factors *p* and *K* depend upon the ohmic resistances of certain parts of the circuit, and they can be adjusted independently of one another by regulating the ohmic resistances in question.

When the charge in the furnace is being heated up, any possible overheating of the heating devices is determined at each instant by the product of the factor *p* and the difference of temperature between the maximum specified for the pieces and the actual temperature of these latter at the time of the control by the regulator, but taking due account of the formula for the action of the couples.

During the maintenance of the pieces at the proper temperature, the amplitude of the variations of temperature of the heating devices cannot exceed the fraction *K* of the temperature of the pieces, for instance 2% of this temperature.

In normal action, the switch C is in the position herein represented, and the measurement is made on the two couples together. When the said switch is placed in the other position, the pyrometer will show the temperature of the pieces.

The switch C may be operated:

a—Manually, in order to control the temperature of the pieces at all times;

b—Periodically, in order to provide successively for the regulation of the furnace according to the two coupled together, and then according to the couple used for the pieces, taken separately;

c—At the same time as the operating of the switch I, for the supply of the furnace, in order to put the heating devices out of use on the combination of the two couples, and to put them in use according to the sole temperature of the pieces.

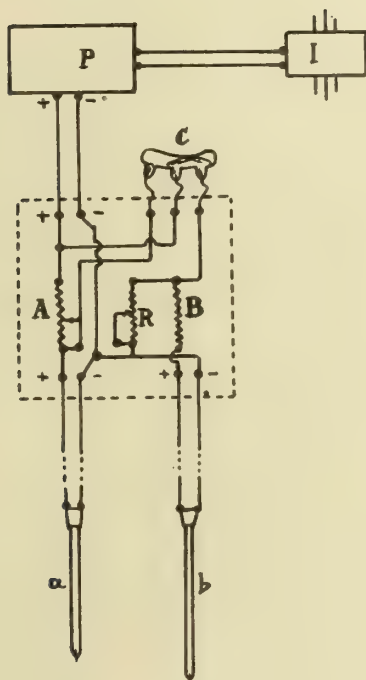
d—Independently by the regulator, in such way that when it takes the position which is not shown, it will serve at the same time to put the heating devices out of use, and when it returns to the position indicated, this movement will put the heating devices in use after a certain time which is sufficient to allow a control by the regulating pyrometer to take place in the meantime on the combination of the two couples, thus acting for or against the order in which the heating devices of the furnace are again put in use.

ERWIN PIERRE JUNG.

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BY A. P. C.

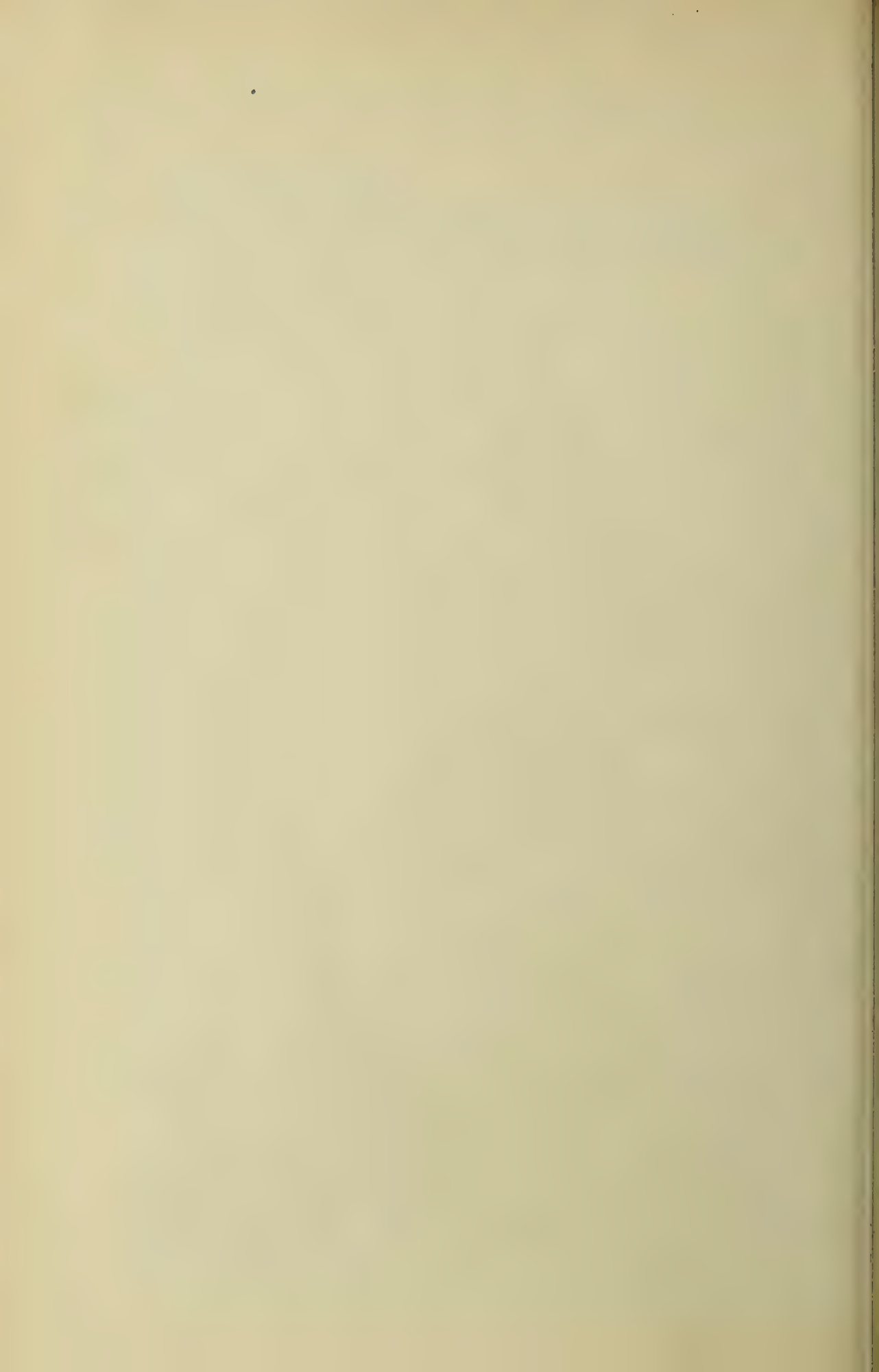
E. P. JUNG
DEVICES FOR REGULATING THE TEMPERATURE OF
ELECTRIC FURNACES OF THE RESISTANCE TYPE
Filed May 11, 1940

Serial No.
334,633



Inventor:

Erwin Pierre Jung



ALIEN PROPERTY CUSTODIAN

PROCESS FOR PRODUCING FILAMENTS, THREADS, FIBRES, BANDS, FILMS AND THE LIKE FROM PROTEINS

Lambertus Alexander van Bergen, Aarle-Rixtel, Netherlands; vested in the Alien Property Custodian

No Drawing. Application filed May 11, 1940

This invention relates to the production of filaments, threads, fibres, bands, films and the like by extrusion of a solution of protein, particularly casein in alkali into a coagulating bath, wherein the coagulated product is hardened by treatment with a hardening agent reacting with the amino groups of the protein.

It is known that proteins, particularly casein, can be made insoluble and water-resistant by subjecting them to a treatment with substances reacting with the amino groups, e. g. methanal. The role of the carboxylic groups also present in the protein complex and to which the property of binding metal ions is attributed, whereby the hydration or solubility should be influenced, is not completely clear. Therefore it is comprehensible that there has been tried to improve the properties of the protein products as to durability and water-resistance by neutralisation of these groups. For this purpose salts of bivalent and polyvalent metals, e. g. salts of barium and calcium, were added to the protein. Also aluminium sulphate and alums are used.

In applying these salts attention has mainly been paid to the positive ion and not or less to the negative ion. According to my invention it has appeared that the formate ion exercises a very specific action, particularly aluminium formate, either or not in combination with other formates. For instance under circumstances being equal for the rest casein fibres having been hardened at 30° C during 6 hours in a bath containing 2% methanal, 10% sulphate of sodium and 5% sulphate of aluminium, will not be hardened to such a degree that they are resistant to boiling in water, whereas fibres having been hardened in a bath containing 2% methanal, 10% formate of sodium and 6.3% crystal water containing aluminium triformal already show after 1 hour a good resistance to boiling though both baths contain an equal amount of aluminium.

The specific action of this formate is not in the least clear, particularly not when realizing that it is also possible that the effect stated has to be attributed to the occurrence of complex compounds, e. g. aluminium triformal $\{Al(OOCH_3)_3(H_2O)_3\}$, the possibility of which occurrence can be supposed in all solutions in which the formate ion is present together with the aluminium ion, independently whether or not also other positive and/or negative ions are present.

I have further found that the composition of the baths can differ very substantially and that the hardening agents may act separately or that their action can take place step-wise. It is also

possible to use other salts together with the formates or to form the formates in the baths. There have to be present, however, one or more positive ions of polyvalent metals, preferably aluminium, if desired together with those of univalent metals, and as the negative ion the formate, if desired together with other ions or even organic substances.

I have also found that hardening baths according to the invention can be obtained by using formate-containing coagulating baths and bringing the products extruded therein into the formate-containing hardening baths without washing. It is also within the scope of my invention to bring the products from coagulating baths containing salts of polyvalent metals immediately i. e. without washing into formate-containing hardening baths.

In U. S. A. application Serial No. 314,380 has been described that in determining the alkali content of a solution of protein in alkali it has to be taken in account that a part of the alkali used for dissolving the protein is bound by the protein so that only the free alkali present in the solution determines the alkalinity of the solution.

I have now found further also that the use of formates in the hardening of fibres, threads, films and the like produced from solutions of protein in alkali, is important for the strength of these products, particularly the strength in wet condition, when they are obtained by extrusion of protein solutions having such an alkali content that at most 0.4 mol of free alkali per kg protein is present, or even such an alkali content that there is a deficiency of alkali bound by the protein.

The significance of this influence of the hardening in the presence of formates is clearly shown by the following table, which relates to a casein solution of 16%, so that 0.2% free NaOH corresponds to approximately 0.3 mol free NaOH per kg of protein.

| | | | | | | |
|----|---------------------|-----|-----|-----|-----|-----|
| | Per cent free NaOH. | 0.5 | 0.3 | 0.2 | 0.1 | 0.0 |
| 45 | Sulphate hardening. | 18 | 20 | 22 | 27 | 27 |
| | Formate hardening. | 18 | 23 | 26 | 29 | 31 |
| | Deficiency of bound | | | | | |
| | NaOH in per cent. | 0.1 | 0.2 | 0.3 | | |
| | Sulphate hardening. | 28 | 28 | 28 | | |
| 50 | Formate hardening. | 32 | 35 | 34 | | |

Various changes may be made in the details disclosed in the foregoing specification without departing from the invention or sacrificing the advantages thereof.

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ALIEN PROPERTY CUSTODIAN

REFRIGERATOR EQUIPPED WITH A MOTOR-DRIVEN REFRIGERATING APPARATUS OF THE COMPRESSION TYPE

Hans Schirrmeister, Berlin-Siemensstadt, Germany; vested in the Alien Property Custodian

Application filed May 23, 1940

This invention relates to a refrigerator equipped with a motor-driven refrigerating apparatus of the compression type.

To avoid the use of stuffing-boxes in such apparatus, the compressor and the driving motor are, as is well known, arranged in a common sealed housing. In such totally enclosed sets, the motor can only be provided with a squirrel-cage rotor. Accordingly, these totally enclosed sets have hitherto been designed for alternating current only. It has already been proposed in such enclosed sets to supply the driving motor with alternating current through a contact-type inverter connected to a direct-current supply circuit. In this case, it is therefore possible to operate the totally enclosed sets designed for alternating current, also with direct current when employing a contact-type inverter which may, for instance, be combined with the refrigerator.

The invention relates to a particularly simple design of a contact type inverter for the above-mentioned purpose. According to the invention the contact type inverter is driven by an electric motor combined with the refrigerator and which preferably at the same time drives a fan for supplying cooling air. Since in the totally enclosed refrigerating apparatus of the compression type a special fan is, as a rule, employed for carrying off the heat of condensation and the waste heat of the motor-compressor set, it is only necessary to couple a contact type inverter with the motor shaft of the fan, thus providing a very simple drive for the inverter. This drive is preferably so designed that the oscillating contact of the inverter is operated by the motor shaft through an eccentric drive.

When employing contact type inverters care should be taken to cool the contacts in an effective manner, since owing to the continual interruptions of the current considerable amounts of heat are liberated which may cause a deterioration of the contacts. According to the invention cooling disks are therefore firmly secured to the contacts of the inverter and have a sufficiently large cooling surface in contact with the outside atmosphere. This arrangement may preferably be so designed that the cooling disks secured to the stationary contacts surround the cooling disks attached to the movable contacts in a bell-shaped manner. By thus designing the cooling disks, a powerful circulation of air may be obtained in operation by the movements of the contacts, owing to the suction and pressure effects brought about thereby so that the cooling of the contacts is very effectively supported by the shape of the cooling disks.

In the accompanying drawings are shown some embodiments of the invention in diagrammatic

form. Fig. 1 shows a circuit diagram of a refrigerating apparatus of the compression type. Fig. 2 shows the drive for the contact circuit breaker.

Referring to the drawings, 1 denotes the totally enclosed motor for driving the compressor; 2 is the fan motor controlling the contact circuit breakers 3 and 4. 5 denotes the thermostat in heat contact with the evaporator and which at the same time connects and disconnects the fan motor and opens and closes the contact circuit breaker serving to supply the alternating current. On the shaft 6 of the fan motor is secured a disk 7 provided with an eccentric 8. The contact 3 has a slot 9 cooperating with the eccentric 8 so that with the fan motor 2 in operation it is caused to oscillate, thus alternately closing the circuit through the counter-contacts 10, 11 and 12, 13 respectively. By varying the amplitude of the contact carrier (spring 3), the time during which the apparatus is inserted in the circuit may be correspondingly adjusted in a known manner.

In order to attain an intense cooling of the contacts of an electromagnetically or motor-driven contact circuit breaker, the contact circuit breaker 21 and the counter-contacts 22 and 23 are rigidly secured to the cooling ribs 24, 25, 26 which may, for instance, consist of copper.

The cooling ribs may have the form as shown in Fig. 3 so that when the contact arm 21 oscillates a powerful circulation of air, which supports the cooling of the contacts, is obtained by the suction and pressure effects occurring alternately in the spaces 27 and 28. The outer surface of the arrangement may come into contact with cooling air blown over the contact arrangement in the direction as indicated by the arrows, for instance, by means of the fan of the refrigerating apparatus.

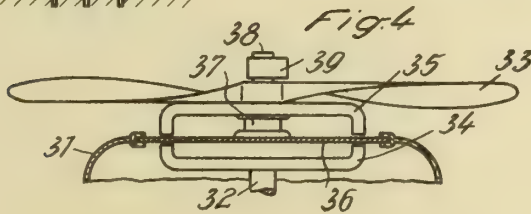
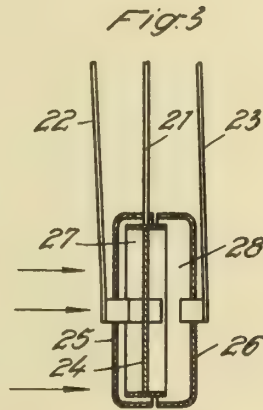
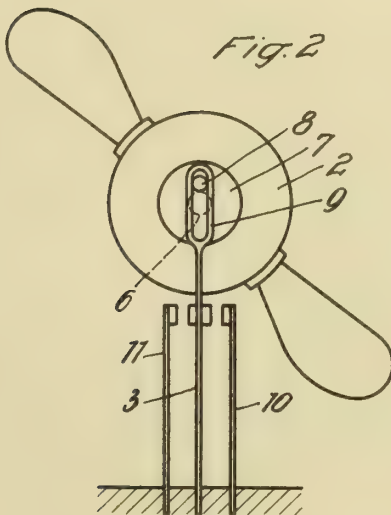
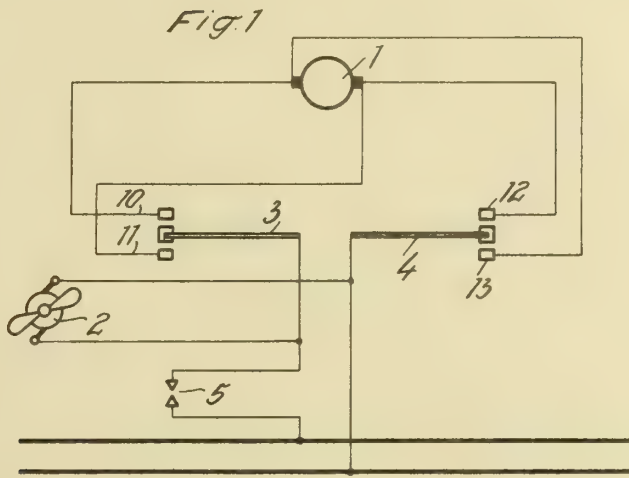
In Fig. 4 is shown another embodiment of the invention in which a totally enclosed motor-driven compressor is employed for the refrigerating apparatus. 31 denotes the housing enclosing the set. 32 is the shaft of the driving motor (not shown). The fan 33 arranged exteriorly of the housing is driven by the electric motor enclosed in the housing. To this end, a magnet 34 is secured to a motor shaft 32, whereas the fan 33 is secured to the second magnet 35. 36 denotes a part of the compressor-motor housing consisting of non-magnetic material and arranged between the two magnets. The fan is mounted in the bearing 37 firmly secured to the part 36 of the housing. To the upper end 38 of the shaft of the fan is secured an eccentric 39 which as shown in Fig. 2 serves to drive a contact type inverter.

HANS SCHIRRMEISTER,

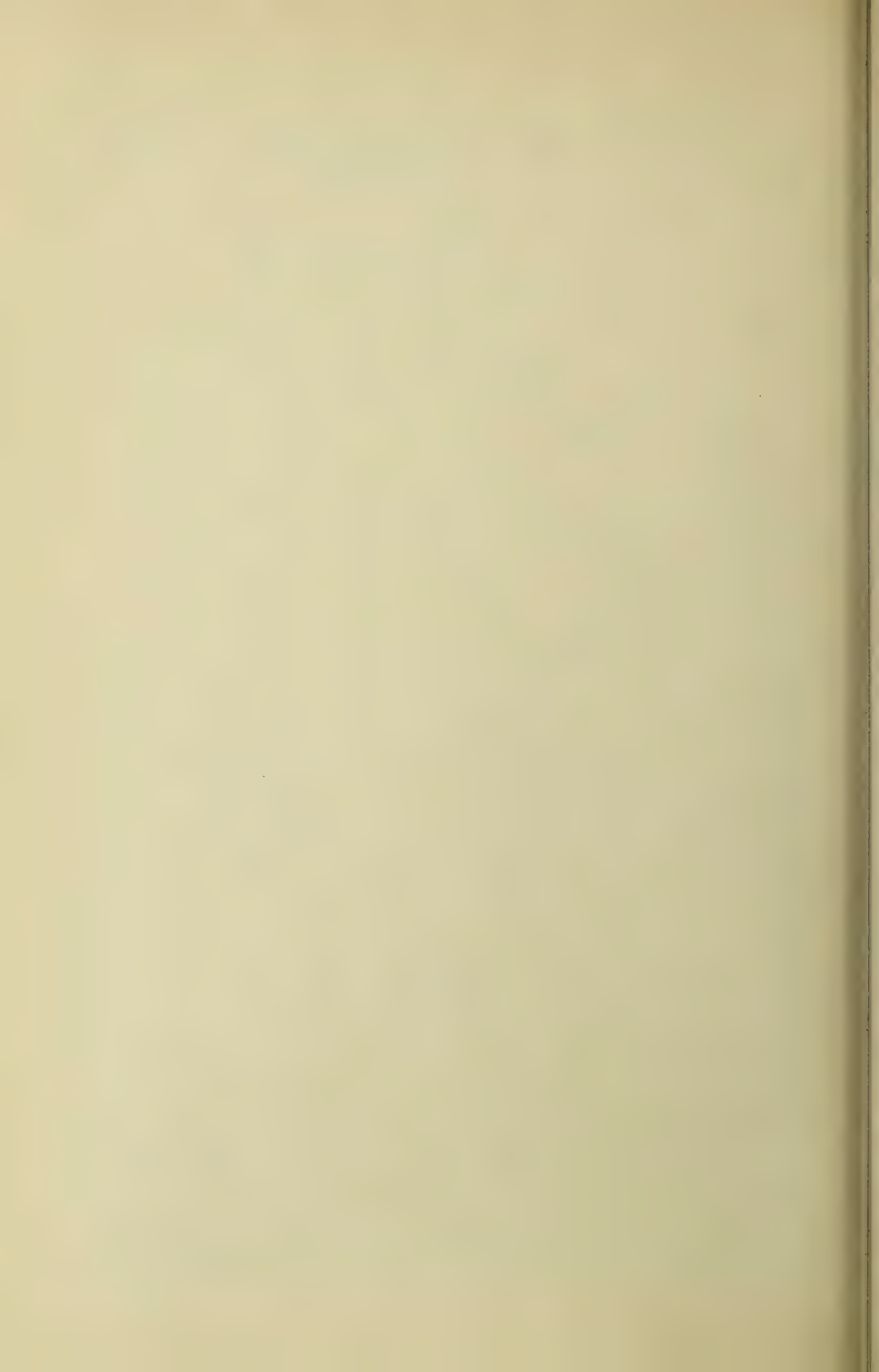
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H. SCHIRRMESTER
REFRIGERATOR EQUIPPED WITH A MOTOR-DRIVEN
REFRIGERATING APPARATUS OF THE
COMPRESSION TYPE
Filed May 23, 1940

Serial No.
336,692



Inventor
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by Knight Bros. Attorneys



ALIEN PROPERTY CUSTODIAN

VULCANIZING MOLDS FOR VEHICLE TIRES MADE OF RUBBER

Carl Hübener, Hannover, Germany; vested in the
Alien Property Custodian

Application filed May 28, 1940

This invention relates to vulcanizing molds for vehicle tires made of rubber.

The object of the invention is the special formation of a vulcanizing mold for vehicle tires made of rubber which are provided on their tread with block-shaped sections.

In the manufacture of vehicle tires, the treads thereof are formed by a smooth prismatic rubber strip which is laid upon the tire foundation that is formed to a large extent of spun material. The smooth tire is then inserted in the vulcanizing mold. In order that the tread pattern, which is applied in raised fashion in the form of a grid on the inside of the vulcanizing mold shall impress itself into the tire, the latter is pressed against the walls of the mold by means of an inserted heated tubing that is subjected to excess pressure. The rubber composition, which becomes soft during the heating process, penetrates into the individual recesses of the mold. One of the objections is that sometimes the formation of the recesses is prevented or hindered by air, caught in the recesses and that does not escape. The tire then shows an incompletely formed tread pattern, so that it cannot be sold and in consequence the product of the vulcanization is a loss.

The invention consists in the provision of angles in the mold recesses corresponding to the block sections and providing cut groove shaped edge depressions which are in connection with one another and with the section joint of the mold.

The invention will be more fully described hereinafter, embodiments thereof will be shown in the drawings and the invention will be finally pointed out in the claims.

In the accompanying drawings:

Figure 1 is a cross-section through the improved vulcanization mold having the tire inserted therein; and

Figure 2 is a perspective view of a vehicle tire manufactured in the mold shown in Figure 1.

Similar characters of reference indicate similar parts throughout the drawings.

Referring to the drawings—

The metal vulcanizing mold consists of two mold halves 1 and 1a which are substantially symmetrical. Into these mold halves the vehicle tire 2 is inserted and is pressed against their walls by means of a heating tubing 3 during the process of vulcanization. On the inside of the mold halves 1 and 1a, the bars 4 which serve for the shaping of the recesses 8 that extend between the individual sectional blocks 5 in the finished tire, are applied in raised fashion. Next to these bars 4, there are cut in everywhere over the exterior surface of the tire, narrow groove shaped depressions 6 which extend round the sectional blocks and are in connection both with one another and with the section joint 7 of the mold. It is these distributed grooves working like a continuous channel in communication with the section joint 7 that permit the free passage of air. By this freedom of action, there is no choking in the pattern itself and the objections to the old and known molds are avoided. These subsidiary channels make it possible, until the very last, for the air that is shut in the mold depressions to escape through the mold section joint 7.

In consequence of the fact that the groove shaped depressions are contrived at the edge of the mold recesses, and because they have only a very small cross-section, they can be filled up only at the last, when the rubber composition has already become very soft. Consequently it is now no longer possible for air to be held fast by irregular entrance of the rubber composition into the mold recesses, with the result that the rubber tires produced in a mold in accordance with the invention, always have a tread pattern that is fully marked in all its details.

CARL HÜBENER.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

C. HÜBENER
VULCANIZING MOLDS FOR VEHICLE
TIRES MADE OF RUBBER
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Serial No.
337,600

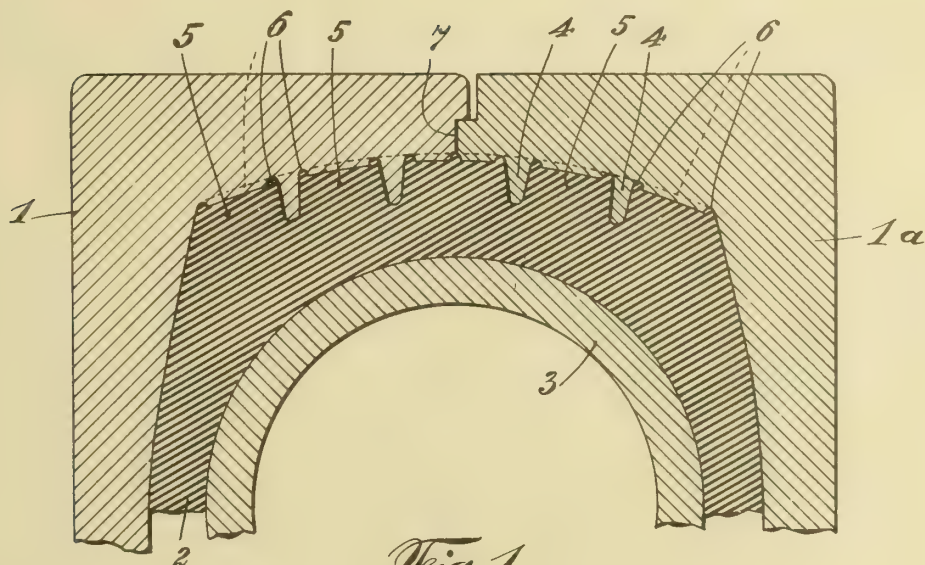


Fig. 1.

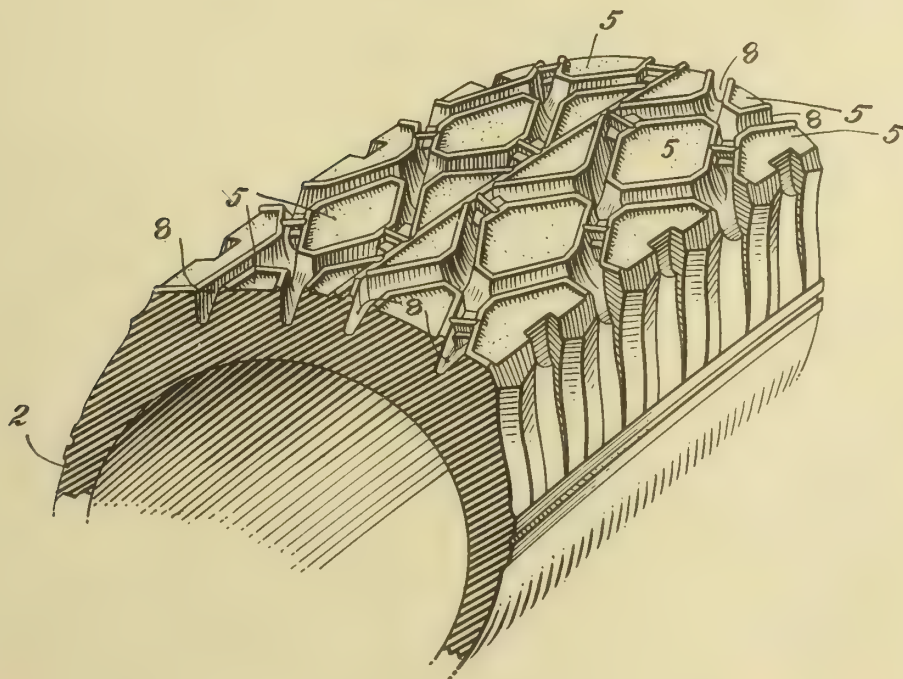
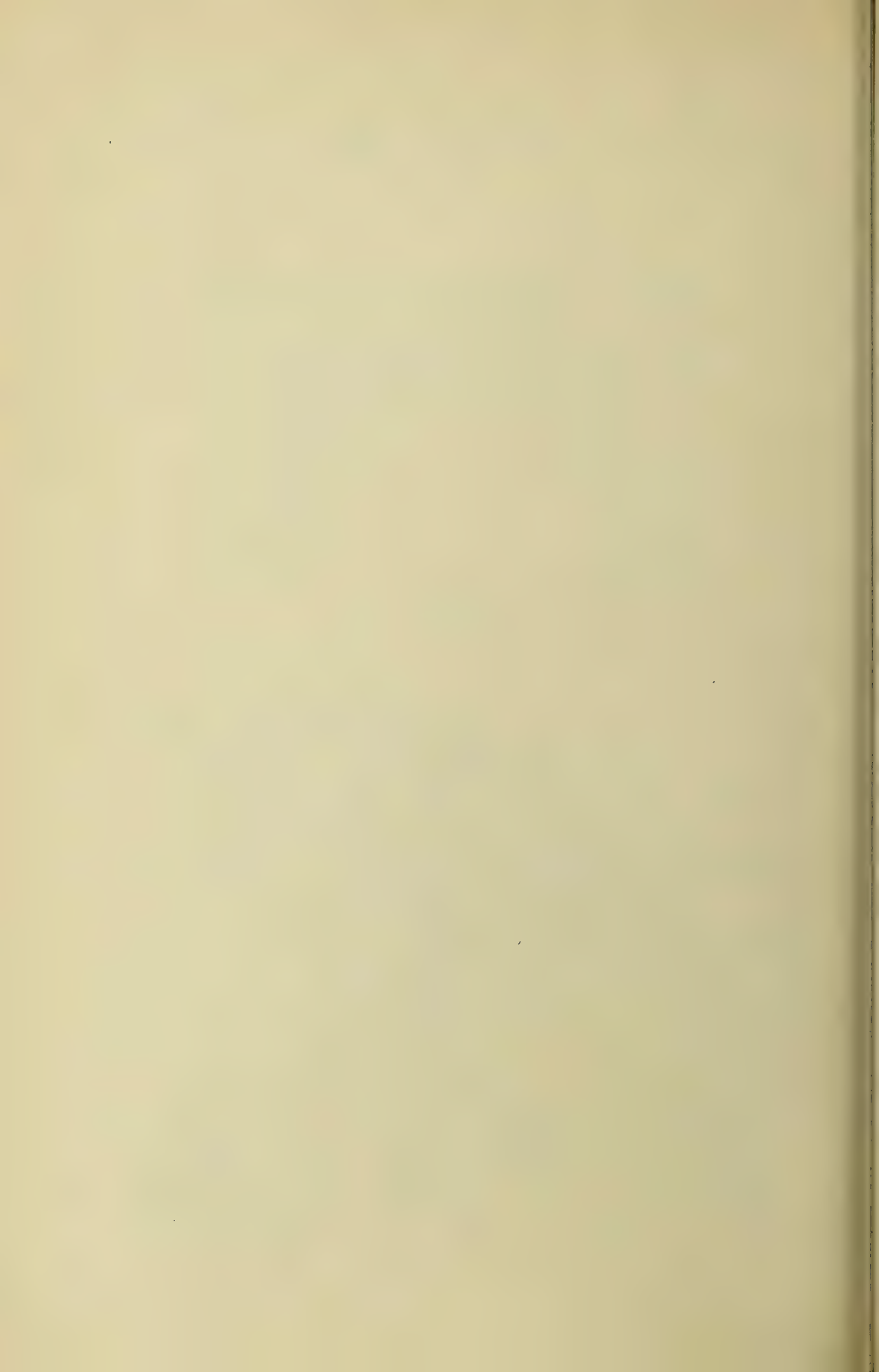


Fig. 2.

BY

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Carl Hübener
C. P. Goepel
ATTORNEY.



ALIEN PROPERTY CUSTODIAN

EJECTING DEVICE FOR POWDER PRESSES, PREFERABLY ARTIFICIAL RESIN PRESSES

Heinrich Schmidberger, Vienna, Germany; vested
in the Alien Property Custodian

Application filed May 28, 1940

It has previously been proposed to equip artificial resin moulding presses, in similar manner to tablet presses, with ejectors the front surface of which forms a part of the mould during the pressing operation and which after the completion of the pressing operation is pressed into the mould in order to expel the pressed article from the mould. These ejectors must be fitted very accurately into the mould, so that the press material cannot penetrate into or escape through any crevices between mould and ejector.

It is a known experience that ejectors of this kind are relatively easily jammed and rapidly wear out. This appears to be due or largely due to the fact that wastes from press material penetrate into the guide of the ejector. This can only be avoided by careful blowing out of the mould after each pressing, and on account of this a completely automatic operation of powder presses of this kind has been rendered very difficult.

It is an object of the present invention to remove or reduce the above mentioned difficulties. According to the invention a groove is provided in the ejecting device directly behind the end face of the ejector, this end face co-acting as part of the mould, the groove being perpendicular or almost perpendicular to the direction of movement of the ejector. In this groove collect then all waste particles which penetrate into the guide of the ejector, so that they can no longer abrade the guiding surfaces. Moreover, in the course of time the waste particles collected in the annular groove stick together to form a packing which lies round the ejector like a piston-ring and so packs the ejector tightly within its guide.

In order that the invention may be well understood an embodiment thereof will now be described by way of example only as applied to a moulding press for artificial resin moulding powder, with reference to the accompanying drawing in which the single figure is a cross-section through the separable mould parts.

Referring to the drawing the mould of an ar-

tificial resin press comprises a matrix 1 and a plunger 2, which may be so proportioned that the prepared pressed article 3 after the completion of the pressing operation remains adhering to the plunger 2 and, when the latter is raised, is lifted up with the plunger into the position shown. A ram-like ejector 4 is mounted in the plunger 2 and the front surface of the ejector 4 is flush with the surface of the plunger 2 during the pressing operation and accordingly forms a part of the plunger wall. The ejector 4 is carefully ground to correspond with the bore of the plunger 2 and is moved downwards relatively to the plunger 2 in the direction of the arrow 5 to eject the prepared pressed article 3. The dropping off pressed article is caught on a slide, conveyor or the like adapted to receive it.

All this is known.

According to the invention a groove 6 is provided within the guiding zone of the ejector 4 which groove lies about 2-3 mm. behind the front surface of the ejector 4 and is about 1-3 mm. deep and also approximately the same in breadth. All particles that may accidentally penetrate into the guide track collect in this groove and form in the course of time a packing 7 as indicated in black.

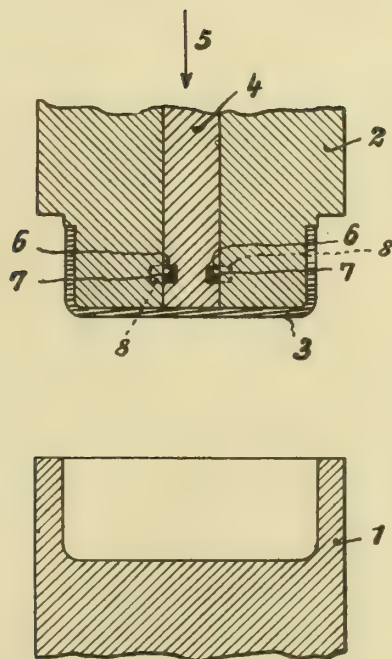
Instead of constructing the groove 6 ring-shaped in the manner illustrated, it may also be given the form of a preferably steeply pitched spiral, or one or more steeply pitched spiral grooves may be joined to an annular groove, so that the particles which penetrate later into this groove may gradually push out upwardly the already collected particles. The groove then requires only occasional cleaning. If desired, the groove may be provided in the wall of the bore in the plunger 2 as indicated by dash line 8. In the practice it is, however, preferable to provide the groove on the ejector 4 because the groove may then be more easily cleaned, since the ejector 4 can naturally be withdrawn from the plunger.

HEINRICH SCHMIDBERGER.

PUBLISHED
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H. SCHMIDBERGER
MOLDING PRESS
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Serial No.
337,674



Inventor:
Heinrich Schmidberger
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ALIEN PROPERTY CUSTODIAN

MACHINES OR APPARATUS FOR THE MANUFACTURE OF MOULDED AND/OR PRESSED ARTICLES

Heinrich Schmidberger, Vienna, Germany; vested
in the Alien Property Custodian

Application filed May 28, 1940

The present invention relates to improvements in or relating to machines or apparatus for the manufacture of moulded and pressed articles, and more especially but not necessarily exclusively to completely automatic presses for artificial resins.

For the production of pressed mouldings a moulding powder is usually employed as starting material. This mass is filled into the mould by means of suitable charging devices and then subjected to a strong pressing between a matrix and a plunger. In many cases, in particular in the production of pressed bodies from urea derivatives, phenol condensation products, or other artificial resins, this pressing is combined with a heating whereby the press material within the mould is softened and additionally polymerized. As soon as the pressed article is ready, the mould is opened and the pressed article ejected.

In semi-automatic presses of this kind the ejectors are often fitted in the lower mould plate, so that they lift up the pressed article and thereby enable it easily to be taken out of the press. By selecting an appropriate mould it is possible to determine beforehand the part of the mould to which the pressed article adheres on opening the press. It can thus be arranged for the pressed article to remain attached to the upper part of the mould on opening the mould. The ejector is then provided on the upper part of the mould.

The present invention is concerned with moulds, moulding presses and the like especially completely automatic artificial resin moulding presses which operate in this second manner and it is an object of the invention to provide in or for such a machine, a device for receiving the moulded articles as they are detached from the plunger or the like and removing them. It is a further object of the invention to provide such a device which acts to prevent waste material such as crumbs broken away from the edges of the articles from falling on to the lower mould part. It is a further object of the invention to provide such a device which is automatic in operation.

According to the present invention a receiving plate is provided for removing moulded articles from the moulds, moulding presses or the like having vertically separable mould parts, and means for bringing said plate or the like underneath the upper mould part upon separation of the mould parts and for causing removal of articles received by said plate or the like therefrom.

A device as above set forth may be arranged so

as to operate automatically upon operation of the mould or moulding press. Thus, for example, the arrangement may be such that upon separation of the mould parts a receiving plate, tray or the like is moved between the mould parts whereupon a suitable ejecting or detaching device removes the moulded article or articles from the upper mould part so that the article or articles drops or drop on to the plate, tray or the like. Thereupon, if desired, after the plate, tray or the like has been moved from between the mould parts the article or articles may be removed therefrom by any suitable means, for example by means of a suitable brushing or sweeping device, by means of a blast of air, or by tilting the plate or tray. If a blast of air is employed it may serve at the same time for blowing any dust, powder or fragments from the mould parts, especially the upper one and for blowing such waste material and separating it from the articles. The said plate or the like may be moved in any suitable manner for example it may be rotated, oscillated or reciprocated into and out of position between the mould parts. In one form of the device the plate or the like, may be passed under a suitable brush, sweeper or the like adapted to sweep articles from the plate or the like but, if desired, a brush sweeper or the like could be moved over the plate or the like.

The plate, tray or the like is preferably made or coated with a suitable yieldable and/or resilient material such for example as rubber or leather in order to reduce the risk of breakage or chipping of the articles.

Any suitable means may be provided for detaching or ejecting the articles from the upper mould part.

The articles removed from the plate, tray or the like may, if desired, be received by any suitable chute, conveyor or receptacle.

In order that the invention may be well understood two preferred embodiments thereof will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a diagrammatically perspective view of certain parts of one form of moulding press incorporating a device for removing the moulded articles, and

Figure 2 is a diagrammatic view partly in section of a press employing a different form of article receiving means.

Referring to Figure 1, 1 is a plunger member and 2 is a matrix the latter standing on the pedestal 3. In each working operation, a suitable predetermined amount of moulding powder is

first filled into cavities 4 of the matrix 2 and then the plunger member 1 is moved downwards in the direction of the arrow 5 until it has been pressed into the matrix 2 and has formed the pressed articles from the powder which has been introduced. On opening the press the prepared pressed article remains adhering to the plunger member 1, so that it is carried upwards with the plunger. When the press is opened a receiving plate 6 is brought under the plunger member 1 by rotating about the axle 7 in the direction of the arrow 8. When the ejectors on the plunger member 1 detach the moulded articles these are received by the plate 6 together with any adhering or crumbling waste or edges. The plate 6 is now further rotated in the direction of the arrow 8, and takes with it the articles and material adhering thereon until it arrives under a fixed brush 10. There the moulded articles are swept off the plate 6 and drop into a box 11. As the plate 6 continues its movement about the axle 7 in the direction of the arrow 8, the matrix is filled

afresh with moulding material and the next pressing is carried out.

Figure 2 shows an embodiment in which pneumatic removal is employed. The pressed article 12 adheres to the plunger 13 and is lifted out with it from the matrix 2. To the right of the plunger 13 is arranged a leather plate 14 which is guided between rollers 15 and 16. When the press is opened, the clamped upper end 17 of the leather plate 14 is moved downwards by a suitably controlled rod or the like, so that the leather plate 14 is moved between the matrix 2 and the plunger 13 as indicated by the dotted lines. Then the ejector 19 is actuated and separates the pressed article 12 from the plunger 13, so that it falls on the leather plate 14. At the same instant pressure air is blown out of the nozzle 20 so that the pressed article together with all adhering dust, broken fragments and the like slide down to the left from the plate 14, on to a chute 21, which leads them to a suitable receptacle (not shown).

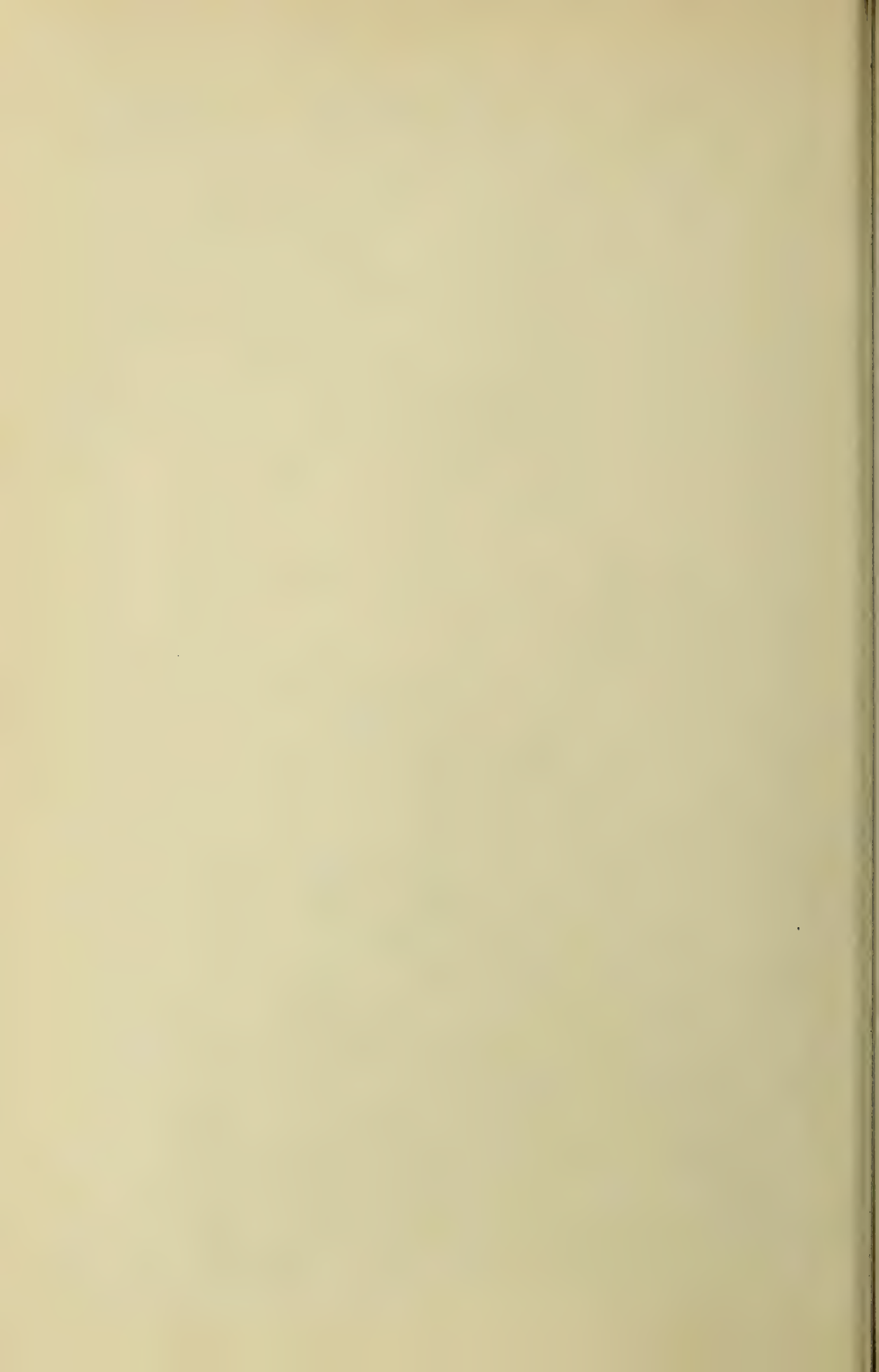
HEINRICH SCHMIDBERGER.

BY A. P. C.

Filed May 28, 1940

337,675





ALIEN PROPERTY CUSTODIAN

ADJUSTABLE REACTION NOZZLE

Anselm Franz and Siegfried Decher, Dessau,
Germany; vested in the Alien Property Custodian

Application filed May 28, 1940

This invention is directed to a reaction or recoil nozzle through which the exhaust gases of an internal combustion engine pass to produce a recoil force which aids in the forward propulsion of a vehicle, as for example, an aircraft. More particularly, the invention is directed to a recoil nozzle which has a variable discharge orifice so that the efficiency of the discharge gases in producing a recoil action is maintained despite changes in atmospheric pressure, and in the velocity of the relative wind.

Recoil nozzles have been developed particularly with respect to aircraft engines, by means of which the gases from the cylinders of the engine are exhausted through a special conduit for each engine cylinder in a direction opposite the movement of the aircraft. In prior known constructions these recoil nozzles were of a fixed construction which could not be adjusted for changes in the physical conditions under which it was operated. The efficiency of a recoil nozzle depends, of course, upon its construction with relation to the pressure of the gases passing therethrough, the pressure of the atmosphere into which the gases are exhausted, and upon the velocity of the relative wind which passes exteriorly of the nozzle and into which the gases are exhausted.

As aircraft are operated at different altitudes and at different speeds, the heretofore known nozzles were efficient for only one predetermined altitude and speed.

It is an object of this invention to produce a recoil nozzle of the type described which can be adjusted so as to function efficiently at different atmospheric pressures.

Another object of the invention is to produce a recoil nozzle of the type described in which the size of the outlet orifice can be varied, so that the efficiency of the nozzle is maintained despite changes in the physical conditions in which it is operated.

Another object of the invention is to produce a recoil nozzle in which the outflow of gas through the nozzle can be maintained at the highest velocity over the greatest period of time possible.

Another object of the invention is to produce a recoil nozzle for an internal combustion aircraft engine in which the efficiency of the nozzle is maintained by automatically adjusting the nozzle to compensate for changes in the altitude and speed at which the aircraft is flying.

Another object of the invention is to produce a recoil nozzle in which the ratio between the gas inlet and discharge orifices of the nozzle can be automatically increased with a decrease in atmospheric pressure into which the gases are discharged, and decreased with an increase of the relative wind into which the gases are discharged.

Generally, these objects are obtained by providing a recoil nozzle with an outlet orifice which

is adjustable as to size. It has been discovered that by varying the ratio between the areas of the discharge and inlet orifices of the nozzle such that the ratio increases with an increase in aircraft flying altitude, and decreases as the speed of the relative wind increases, the nozzle can discharge the gases with a substantially constant maximum recoil efficiency. The adjustment may be easily obtained by utilizing a member which is sensitive to change in barometric pressure and the pressure of the relative wind, these changes being used to actuate the adjustable orifice. For example, a Venturi tube may be used in combination with a spring balanced piston as the instrument sensitive to the changes in the physical conditions, and these changes may be used to actuate a shutter for varying the opening of the discharge orifice of the nozzle.

The means by which the objects of this invention may be obtained are more fully disclosed in the accompanying drawings in which:

Fig. 1, diagrammatically, is a cross-sectional view of a recoil nozzle of unvariable shape attached to a cylinder of an internal combustion engine.

Fig. 2 is a graph disclosing the effect of changes in the atmospheric pressure into which the gases from the nozzle of Fig. 1 are discharged, upon the velocity and time of discharge of the gases from the nozzle.

Fig. 3 is a graph disclosing the effect of changes in the size of the discharge orifice of the nozzle upon the velocity and time of the discharge of the gases from the nozzle.

Fig. 4, diagrammatically, is a cross-sectional view of a recoil nozzle having a discharge orifice constructed according to this invention.

In Fig. 1 a recoil nozzle 2 is shown attached to a cylinder 4 of an internal combustion engine within which is the conventional piston 6. The gases enter the nozzle 2 through throat 8 in which an exhaust valve 10 is diagrammatically indicated. The gases are exhausted from the nozzle 2 into the atmosphere through the orifice 12 which, in this nozzle, is of invariant cross-section. In the discharge of the gases from the cylinder 4 through the nozzle 2 into the atmosphere, the gases are exhausted from the combustion chamber at a variable pressure P_1 , through the throat 8 into the nozzle 2 where the gases have a variable pressure P . The gases are exhausted from the nozzle 2 through the orifice 12 into the atmosphere. The quantity of gas entering nozzle 12 is dependent upon the pressure P and on the cross-sectional area f_v of the throat 8. The quantity of gas passing through orifice 12 is dependent upon the atmospheric pressure P_2 adjacent the orifice. The discharge end of the nozzle 2, containing orifice 12, has different shapes all depending upon the relationship between the

pressure of the atmosphere and the pressure P in the nozzle. For example, the nozzle may have the shape disclosed in Fig. 1 if the pressure ratio P_2/P is hypercritical, and the cross-sectional area f_a of orifice 12 then serves as the critical discharge dimension of the nozzle. If the pressure ratio P_2/P is sub-critical, a Venturi discharge nozzle would be used, and the cross-sectional area of its end would be the critical area.

The pressure P in nozzle 2 periodically varies as the gases are forced from the combustion chamber into the nozzle, and the degree of variation depends upon changes in the cross-sectional area ratio f_a/f_v . Furthermore as may be seen from Fig. 1, during the exhaust period, that is when when valve 10 is open, a greater quantity of gas will enter nozzle 2 then can be discharged therefrom during the same period of time. Of course, discharge from nozzle 2 continues when exhaust valve 10 is closed and does not stop until P and P_2 are equalized. Consequently, the variation of pressure P within the nozzle 2 is also dependent upon P_2 . The velocity of the discharge of the gases through orifice 12 is dependent primarily upon the ratio P_2 to P . It is apparent that for aircraft engines the pressure P_2 varies inversely as the altitude at which the engine is being operated.

Thus a nozzle which has a fixed ratio of f_a/f_v will not operate the same at all altitudes. This is graphically demonstrated in Fig. 2 wherein the velocity of discharge of the gases from a nozzle over a period of time is shown for three different altitudes. The curve H_1 shows the velocity of the gas passing through orifice 12 plotted against the time of discharge for the highest altitude. The curves H_2 and H_3 disclose the discharge of the gas from the same nozzle at successively lower altitudes. It is thus seen that at the lowest altitude H_3 , the gas maintained a substantially constant velocity w_3 only between the points I and II during the time t'_3 . The same nozzle operated at the highest altitude H_1 maintained a higher velocity w_1 over a longer period of time t'_1 .

As it is desirable to maintain a substantial constant velocity of the gases discharged from the nozzle during as long a time as possible, it is clear that it is necessary to change the nozzle as the atmospheric pressure P_2 changes, as occurs at different altitudes. Changing of the size of the discharge orifice 12 will change the relationship f_a/f_v which accordingly changes the ratio between P and P_2 . Therefore as the altitude increases, the cross-sectional area ratio f_a/f_v must be increased.

The maximum dynamic efficiency of a reaction nozzle is dependent upon the velocity of the gases discharged from the reaction device with respect to the speed of the relative wind passing the exhaust nozzle 1, the latter of course, being essentially determined by the velocity of the aircraft. As aircraft fly at different speeds, it is apparent that the discharge velocity w of the exhaust gases must be varied in order to maintain the maximum dynamic efficiency of the nozzle. Fig. 3 illustrates the effect upon the discharge velocity of the exhaust gases when the ratio $\alpha = f_a/f_v$ is varied. The curves $\alpha_1, \alpha_2, \alpha_3$ represent the effect upon the discharge velocity w over a period of time when the aircraft is traveling at the same speed and at a constant altitude, the area of the

discharge orifice being varied. The curve α_1 represents the least cross-sectional area of f_a/f_v and shows that at this ratio the discharge velocity w_1 of the gases through the outlet orifice of the nozzle is the greatest over the longest period of time t_1 . Both the time of the discharge and the velocity of gases decreases with increase of cross-sectional area ratio f_a/f_v . Consequently, the cross-sectional area ratio must decrease as the speed of the aircraft increases in order to maintain the maximum dynamic efficiency of the recoil nozzle.

An apparatus for varying the relationship between f_a/f_v so that the ratio can be increased for an increase in altitude or decrease of P_2 , and decreased upon an increase of flying speed, is shown in Fig. 4. The nozzle 14 has a unconstricted opening 16 into the atmosphere. The discharge orifice is obtained by means of a shutter 18 which may be hinged at 20 to nozzle 14. This shutter is operated through a crank 22 attached to an arm 24, and to the connecting rod 26 of a piston 28 mounted in a cylinder 30. A spring 32 of a predetermined pressure is mounted on one side of piston 28, while the other side of piston 28 communicates with the pressure of the atmosphere and of the relative wind V through manifold 34 and a Venturi tube 35. The spring loaded end of piston 28 communicates with the atmosphere through a port 36.

It is apparent that as the shutter 18 is moved by piston 28, the cross-sectional area f_a of the discharge orifice of nozzle 14 will be varied.

In accordance with the requirements as illustrated by the graph of Fig. 3, when the velocity of the relative wind V increases, if the speed of the aircraft is increased, the pressure in the Venturi-tube 35 decreases, the piston 30 is urged downwardly by the spring 32, and the shutter 18 rises to decrease the cross-sectional area f_a and thus to decrease the ratio f_a/f_v , in order to maintain the gas velocity w , the greatest for the longest period of time as illustrated for the curve α_1 , Fig. 3.

The apparatus of Fig. 4 is merely illustrative of one form of apparatus which can satisfy the requirements of maintaining the proper ratio f_a/f_v , which is preferably within the limits 0.4 to 1.6. Other apparatus which are responsive, for example to the temperature of the exhaust gases, or to other physical factors, can be used to vary automatically the size of the discharge orifice, and thus to maintain the proper ratio of f_a/f_v .

It is therefore apparent that the invention maintains the maximum efficiency of the recoil nozzle despite changes in the physical conditions under which it is operating, and that this change is effected by making the cross-sectional area f_v upon which depends the amount of gas entering the exhaust nozzle per unit of time, proportional to the cross-sectional area f_a of the discharge orifice upon which depends the amount of gas discharged from the nozzle per unit of time. The device increases this proportion or ratio as the altitude of the aircraft increases, and decreases the ratio as the speed of the aircraft increases. Continuous and automatic regulation of the f_a/f_v ratio is obtained to keep the recoil nozzle working at maximum efficiency.

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A. FRANZ ET AL
ADJUSTABLE REACTION NOZZLE
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Fig. 1

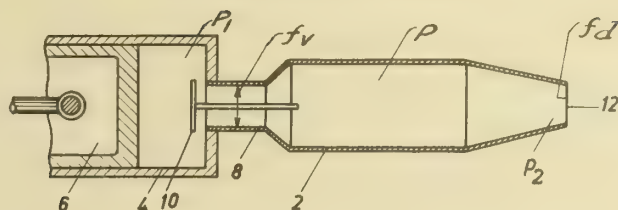


Fig. 2

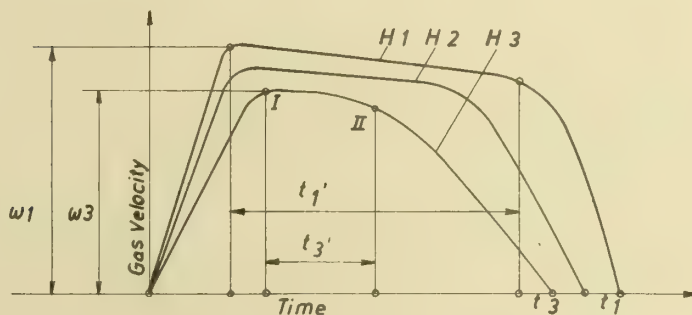


Fig. 3

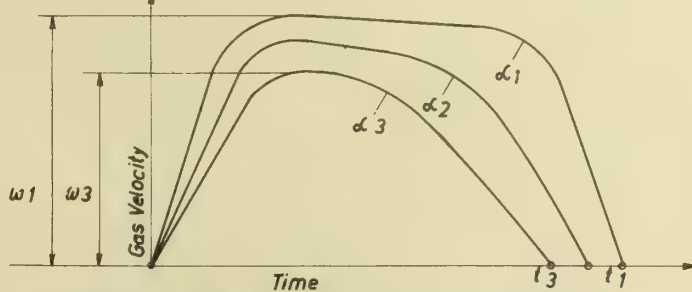
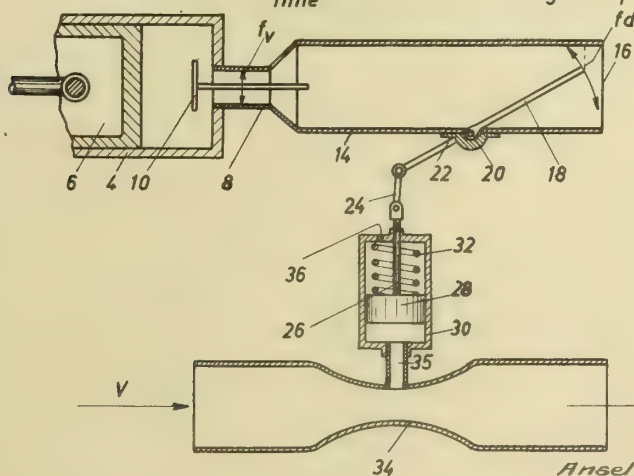
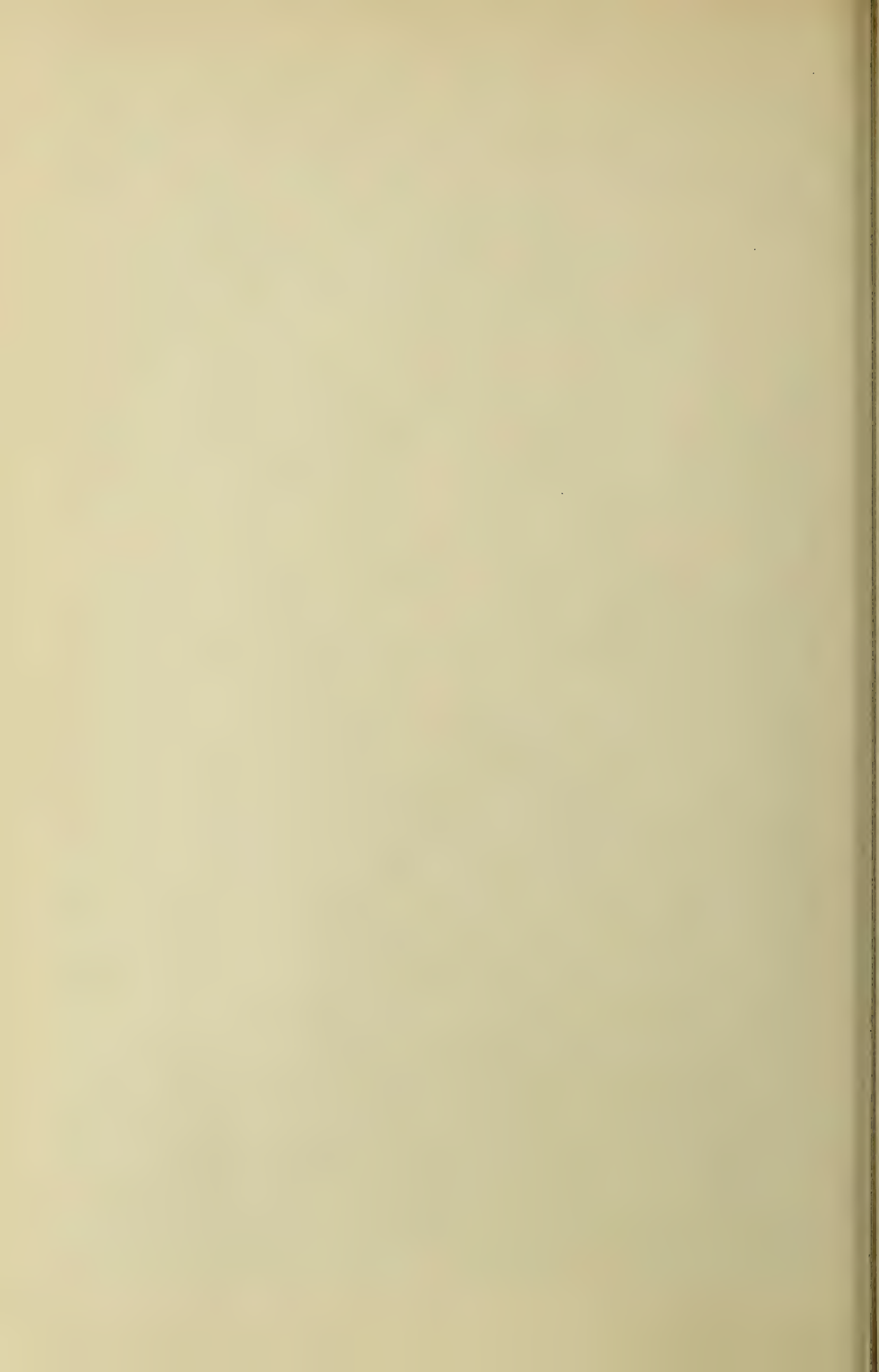


Fig. 4



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ALIEN PROPERTY CUSTODIAN

MOTOR-DRIVEN REFRIGERATING APPARATUS OF THE COMPRESSION TYPE

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Application filed May 29, 1940

This invention relates to improvements in motor-driven refrigerating apparatus of the compression type.

In developing electric motor-driven refrigerating apparatus of the compression type, particularly of such apparatus designed for domestic refrigerators, endeavors have already been made to keep the weight thereof as small as possible. A possibility of reducing the weight of the compressor-motor set, the motor output being equal, consists in employing a high-speed compressor-motor set. This, however, gives rise to trouble, particularly when employing sets operating with piston compressors in that the reciprocating parts of the compressor are the more difficult to balance, the higher the speeds will be, so that it had hitherto not been usual to operate driving motors directly coupled to the compressor at speeds higher than 1500 r. p. m. The dimensions of a compressor-motor set operating at a speed of 1500 r. p. m. correspond to predetermined dimensions of the refrigerator cabinet.

The object of the present invention is to provide an electric motor-driven refrigerating apparatus of the compression type, in which a motor-compressor set is employed having considerably smaller dimensions and therefore a correspondingly less weight. This may be accomplished according to the invention by employing as a driving motor a single-phase induction motor directly coupled to the compressor whose speed when connected to a 50-cycle current supply circuit amounts to 3000 r. p. m. By the use of a compressor-motor set of considerably smaller dimensions and therefore of less weight it is possible to design the refrigerator cabinet in a manner far more advantageous than has hitherto been the case. In the refrigerator cabinets hitherto known a considerable space is, as a rule, required below or above the cooling chamber for the accommodation of the compressor-motor set. Only absorption refrigerating apparatus could hitherto be built so flat as to be mounted on the rear or on one of the lateral walls of the cabinet. Since the compressor-motor set according to the invention has small dimensions it may be mounted as is the case with absorption refrigerating apparatus on the rear or on one of the lateral walls of the cabinet, without it being necessary to provide too large a space for this set. By mounting the compressor-motor set, for instance, on the rear wall of the cabinet, the great advantage is presented in that the heat radiating parts of the apparatus may effectively be cooled by exposing them to the strong natural

draught of an air duct acting as a chimney and extending at the rear of the cabinet in the upward direction without the necessity of employing a fan for cooling the heat radiating parts.

5 The compressor-motor set and the condenser may be arranged as separate units. However, it is also possible to combine the condenser with the compressor motor set. To this end, for instance, the housing for the compressor-motor set and condenser is made of two metal sheets secured together around their edges by welding to form a pressure-tight container, in which are indented channels which form the refrigerant conduits for the condenser as well as recesses forming the space for the reception of the compressor-motor set. Owing to the small dimensions of the compressor-motor set it is therefore easily possible to mount such a plate condenser combined with the set on the rear or the lateral wall of the refrigerator cabinet without the indented portions of the metal sheets, necessary for the compressor-motor set, taking up substantially more space than is necessary for an unobjectionable flow of cooling air for the condenser. 10 By mounting the compressor-motor set on the rear or lateral wall of the refrigerator cabinet, the further advantage is obtained over the known refrigerators equipped with a refrigerating machine of the compression type in that a considerable saving in material is attained, since the upper or lower machine compartment of the cabinet may be dispensed with.

To dissipate the heat from the compressor-motor set in an effective manner it is particularly advantageous, especially in the case of the high-speed compressors employed according to the invention to carry off indirectly to cooling surfaces the waste heat from the compressor-motor set with the aid of a liquid available in the apparatus, i. e., with the aid of the lubricant or refrigerant.

The invention may also be employed for motors operating at higher speeds than 3000 r.p.m. Higher speeds may, for instance, be attained, if the motor is connected to a 50-cycle current supply circuit through suitable frequency changers.

In the accompanying drawings are shown two embodiments of the invention in diagrammatic form.

Fig. 1 is the rear elevation and Fig. 2 is a side elevation, partly in section of a domestic refrigerator cabinet equipped with a refrigerating apparatus of the compression type. Fig. 3 shows another embodiment of the invention, in which the refrigerating apparatus of the

compression type is secured to the rear wall of a domestic refrigerator cabinet.

Referring to the drawings, 1 denotes the housing of the compressor-motor set. The refrigerant passes from the evaporator (not shown) through a conduit 2 into the compressor. The compressed refrigerant is forced into the upper pipe 4 of the condenser through the pressure conduit 3. This condenser consists of a plurality of parallel-arranged pipes 4, the ends of which are pressed together, then sealed and welded to the supports 7 and 8. The cross pipes 4 are provided with perpendicular cooling ribs 9 which enlarge the heat radiating surface of the condenser. The end portions of the pipes 4 are connected with one another by means of cross tubes 10 and are thus combined to form the condenser. 11 denotes the refrigerant conduit extending from the lower part of the condenser to the float-operated valve 12, to which is connected the conduit 13 extending to the evaporator.

In the embodiment shown, the compressor-motor set is cooled with the aid of the liquid refrigerant. To this end, the upper three condenser pipes 4 are combined to form a cooler so that the refrigerant liquified in the same is supplied to the upper part of the compressor-motor housing 1 through a conduit 14. The lower five condenser pipes thus form the condenser proper, from which the liquid refrigerant passes into the evaporator through the float-operated valve 12.

To the compressor-motor housing 1 are welded angle irons 16 and 17 secured by interposition of rubber layers to corresponding angle irons 18 and 19. The last-mentioned angle irons are welded to the vertical angle irons 7, 8 serving as supports. The compressor-motor housing is arranged together with the float-operated valve 12 beneath the cooling chamber. Since the compressor-motor set is cooled in this case indirectly by the liquid refrigerant, the housing 1 may be enclosed by a hood 20 in the manner as shown in Fig. 2 so that the parts of the set arranged below the cooling chamber cannot directly be viewed from outside. The hood serves at the same time

to damp the noise produced in the housing 1. In the embodiment shown in Figs. 1 and 2, the refrigerator cabinet is so designed that it may be mounted on the wall. To this end, eyes 21 are attached to the supports 7 and 8.

The inner casing 22 is secured in this method with the aid of the supports 23 to the frame consisting of the condenser pipes 4 and the vertical angle irons 7 and 8. The cooling air enters the refrigerator in the direction as indicated by the arrow through the air duct extending at the rear of the refrigerator cabinet so that the heat may be dissipated without the use of a fan.

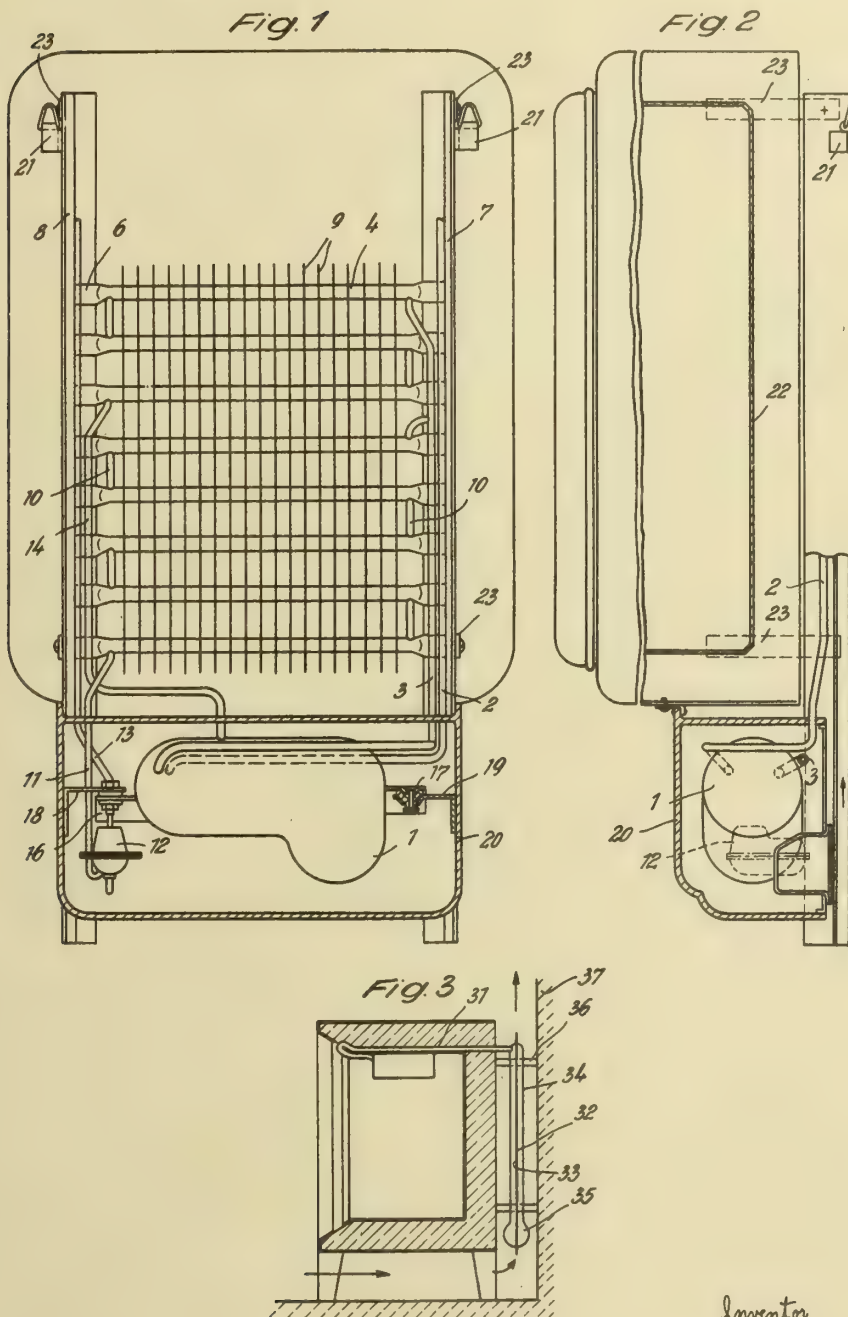
Fig. 3 shows another embodiment of the invention in diagrammatic form in which the refrigerating apparatus of the compression type is secured to the rear wall of a domestic refrigerator cabinet 31. In this case the housing of the compressor motor set and condenser of the refrigerating apparatus is made of two metal sheets 32, 33 secured together around their edges by welding to form a pressure-tight container. In the latter are indented channels 34 which form the refrigerant conduits for the condenser as well as recesses 35 forming the space for the reception of the compressor-motor set. In this case the compressor-motor set is preferably resiliently supported within the housing thus formed. Also in this case the set may be cooled by the liquid refrigerant which flows from a part of the condenser back into the upper part of the compressor-motor housing so as to be evaporated again. Owing to the small dimensions of the refrigerating apparatus according to the invention it is possible to locate such a condenser-motor set in a comparatively narrow air duct, spacing members 36 being arranged between the rear wall of the cabinet and the wall 37 to provide the necessary space for the cooling air. In this embodiment a very strong air draught is brought about as indicated by the arrows so that the heat developed may be easily dissipated to the atmosphere with the aid of the cooling surface of the set without the necessity of employing a fan.

RUDOLF HINTZE.

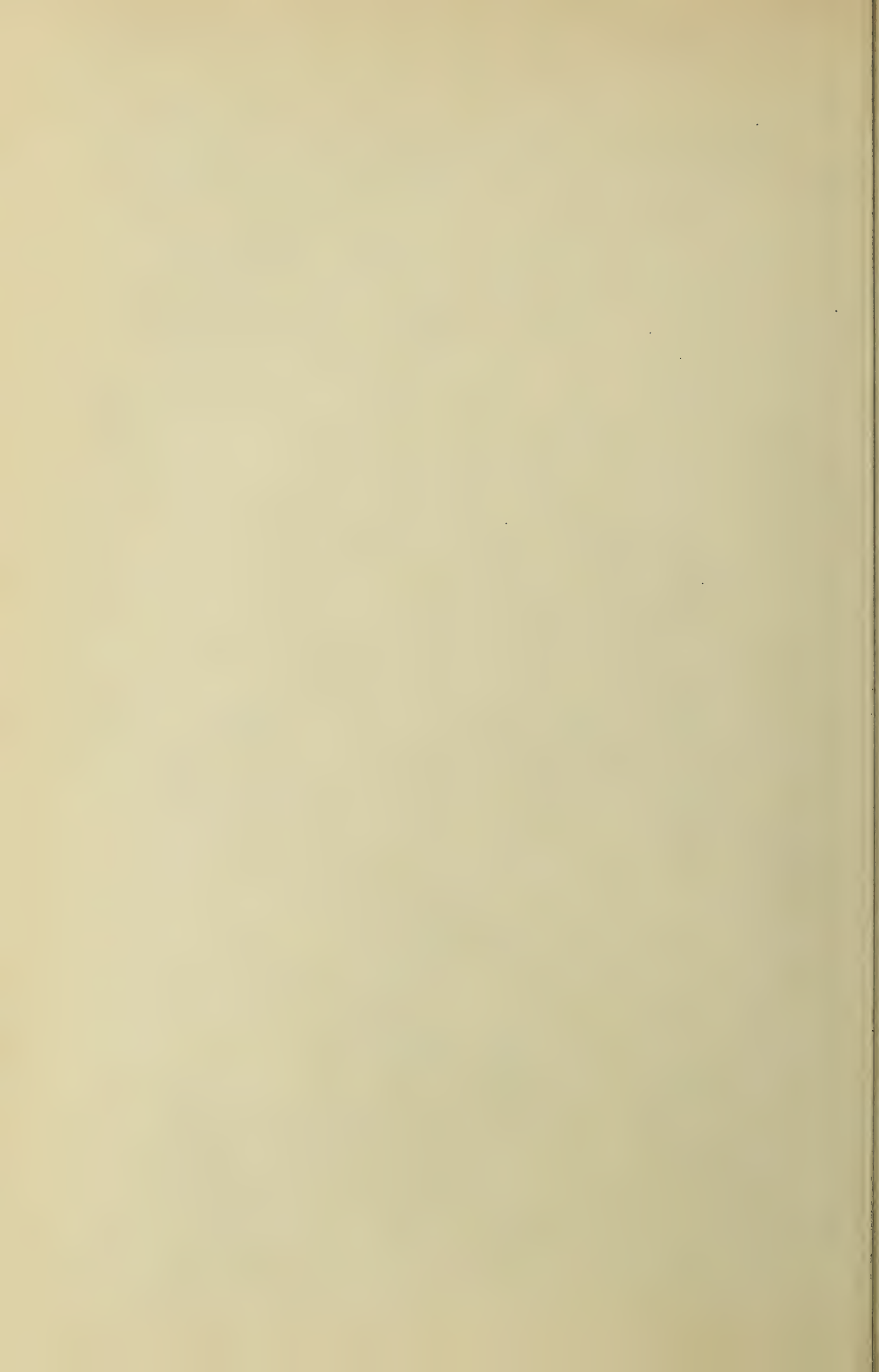
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ALIEN PROPERTY CUSTODIAN

PROCESS OF PRODUCING ARTICLES BY AN INJECTION MOULDING MACHINE

Gerhard Kirchner, Roda bei Ilmenau, Thuringia, Germany; vested in the Alien Property Custodian

Application filed June 5, 1940

My invention relates to a process of producing articles by an injection moulding machine from a cellulose ester material, more particularly from celluloid.

In a machine of this type the material is fed in comminuted condition into a cylinder and is heated therein to a temperature rendering it plastic, whereupon the material is injected by a plunger through a nozzle into a mould. In the mould, the material cools and solidifies immediately and is then ejected therefrom. The material operated upon in this manner must be capable of being heated to a temperature surpassing the solidifying point sufficiently to enable it to completely fill the cold mould before solidifying therein. For this reason, it has been common practice prior to my invention to raise the temperature of the heating cylinder through which the material is fed, to a temperature of at least 300 centigrades.

These conditions of operation have precluded the possibility of working celluloid in injection moulding machines, as this material, when heated to a temperature in excess of about 200 centigrades and subjected to pressure, is liable to explode. It is highly desirable, however, to use celluloid in injection moulding machines as this material is available on the market at a low price and has very favorable properties, such as high elasticity and strength, a high electrical conductivity and insolubility by gasoline and benzol.

A chemically related material, to wit cellulose acetate, has been successfully moulded in injection moulding machines as this material is capable of resisting much higher temperatures. In order to render it sufficiently plastic, a pulverized plastifier is added thereto.

Attempts, however, of making use of such plastifiers for moulding celluloid in an injection machine have not been successful. Experience has shown that added plastifiers either adversely affect the properties of the moulded articles rendering the same turbid and soft or, if added in a smaller proportion, are incapable of increasing the plasticity of the celluloid within the permissible temperature limits sufficiently to enable the material to completely fill the mould.

I have found that cellulose esters, particularly celluloid, can be successfully operated upon in an injection moulding machine, if the material is subjected to a preparatory treatment by bringing the material into an atmosphere containing a volatile solvent. In this atmosphere the material is kept sufficiently long to soften it but is

removed therefrom, before it assumes a sticky consistency, and is then fed into the injection moulding machine. If the raw material is in granulated condition, the preparatory treatment by vapors of acetone, alcohol, amyl acetate or the like will take about ten minutes. Preferably, the material is brought into a closed space containing the solvent but is kept out of contact therewith. The heating cylinder of the injection moulding machine is heated to so low a temperature as to preclude any risk of explosion heating the celluloid to a temperature ranging from 90 to 150 centigrades, preferably to a limit in the neighbourhood of 120 centigrades. The article so produced are fully homogeneous and satisfactory in any respect.

While my invention offers the greatest advantages when applied to celluloid, it is applicable to other thermoplastic cellulose esters, such as cellulose acetate or to a material marketed under the trade name "Astralon."

When applied to such materials it offers the advantage that pulverized plastifying agents need not be added and that, therefore, the material need not be pulverized for the purpose of such addition. Also, it permits the production of transparent articles which cannot be produced, when a pulverized plastifying agent is added.

I may add suitable filling materials such as wood pulp, fibrous materials or the like to the raw material, particularly to celluloid, and in this event subject these filling materials to the same preparatory treatment. This may be done by pulverizing the raw material by admixing the filling material and by subjecting the mixture so obtained to the preparatory treatment by vapors of solvents. I have found that the proportion of the filling material may be raised up to 50% of the mixture without adversely affecting the properties of the articles so produced.

The duration of the preparatory treatment must be so limited that the material will not swell and will not become sticky. Otherwise, the articles produced therefrom would remain soft and sticky and would be difficult to remove from the mould.

An example of my improved process will now be described by reference to the accompanying drawing in which an injection moulding machine and means for the performance of the preparatory treatment are illustrated.

Waste celluloid in form of chips and sheets is so comminuted that the largest particles may freely pass through the lower mouth of the hopper 10 of the injection moulding machine. This

machine comprises a cylinder 11 into which the thermoplastic material may be fed through the hopper 10. The cylinder is provided with a heating jacket 12, whereby the material fed into the cylinder is heated to plastic condition, and terminates in a nozzle 13, which may be pressed against the mouth of a mould 14. The material fed into the cylinder 11 is injected in plastic condition into the mould through the nozzle 13 by the piston 15. After the material injected into the mould has solidified, the mould is opened and the finished article is ejected therefrom. At the same time, the piston 15 is withdrawn and new material fed into the cylinder through the hopper 10 for the subsequent cycle of operation. As machines of this kind are well known in the art, as detailed description thereof may be dispensed with.

Numerous attempts have been made prior to my invention to work on celluloid in machines of this kind, as this material has numerous valuable properties and is available on the market at a low price. These attempts have not met with success, however, as celluloid must not be heated beyond a temperature of about 200° C and, at this temperature, is not sufficiently plastic to completely fill the mould, since it solidifies therein prematurely. I have found that the preparatory treatment described hereinabove fully remedies this condition.

I may carry out this treatment by means of a rotary drum 16 mounted on a horizontal stationary axle 17. The drum which is provided with an opening and may be sealed by a cover plate 18, is charged with a suitable quantity 19, e.g. 60 pounds, of the comminuted celluloid. An open container 20 mounted on the stationary shaft 17 within the drum is filled with a suitable solvent, for instance, with one quart of acetone or alcohol. Then, the drum is sealed and is rotated for about twenty minutes. This process is carried out at normal temperature. Then, the cover 18 is opened and the material is discharged into the hopper 10 which is then closed by a cover plate 21.

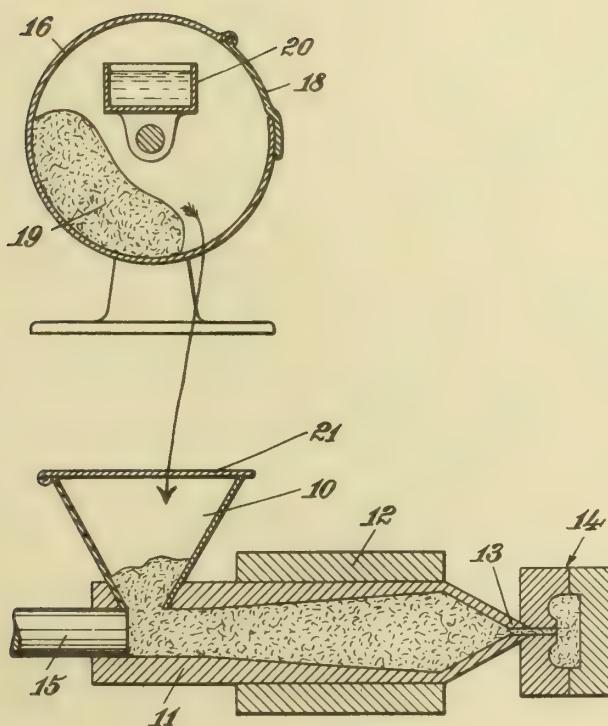
The period of time over which the preparatory treatment of the material 19 should be extended varies with the nature of the material and of the solvent and may be readily determined by experiments. It must be so chosen as to reduce the softening temperature of the material sufficiently to secure a complete filling of the mould 14 without, however, rendering the material so soft that the articles will remain sticky. Care must be taken to prevent the material from coming into contact with the liquid solvent. As stated hereinabove, the material 19 may contain a suitable proportion of filling materials unless it is desired to produce transparent articles.

GERHARD KIRCHNER.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

G. KIRCHNER
PROCESS OF PRODUCING ARTICLES BY
AN INJECTION MOULDING MACHINE
Filed June 5, 1940

Serial No.
338,886



Inventor

GERHARD KIRCHNER

By

Alfred E. Lackenbach
Attorney

ALIEN PROPERTY CUSTODIAN

PROCESS OF MANUFACTURING SODIUM CYANIDE

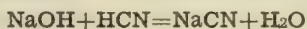
David Kusman, Brussels, Belgium; vested in the
Alien Property Custodian

No Drawing. Application filed June 5, 1940

The present invention relates to the manufacture of sodium cyanide by direct neutralisation of caustic soda with hydrocyanic acid.

The neutralisation of caustic soda by means of hydrocyanic acid is usually carried out by leading a current of gaseous hydrocyanic acid into a more or less concentrated solution of caustic soda. A solution of sodium cyanide is obtained and, after evaporating same under vacuum, cyanide may be collected in powder form.

It is not possible however to obtain a pure product in this manner, as sodium cyanide is not stable when in solution. Towards the end of the neutralisation process a partial decomposition tends to take place and this tendency increases as the temperature rises. The decomposition is made apparent by darkening of the color of the product which becomes more and more brown as the duration of evaporation is longer. Now the amount of water to be evaporated at low temperature is considerable, as the amount of water in which the caustic soda is dissolved is increased by a further amount resulting from the neutralisation reaction:

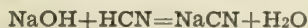


If browning of the solution is to be avoided a substantial amount of caustic soda must be allowed to remain in the solution, so that in the final product obtained by dry evaporation the NaCN content hardly exceeds 90%.

In order to dispense with evaporation and the consequent inconveniences, it has been proposed to carry out neutralisation by reacting hydrocyanic acid with solid anhydrous caustic soda in powder or in flake form, towards 200° C. It was thought that at that temperature there would be no browning of the product, the water formed by the reaction being directly converted into vapor. This however, is not always the case and moreover this method only makes it possible to convert up to 60% of the caustic soda treated. In order to obtain a richer product it is necessary again to crush the mass and again to saturate same with hydrocyanic acid, these operations often having to be repeated several times. This method accordingly is complicated and unreliable; it requires a large number of absorption receptacles and the use of elevated temperatures which is not without danger with a gas of the nature of hydrocyanic acid.

It has also been proposed to neutralise with hydrocyanic acid a concentrated (1:1) aqueous solution of caustic soda, then to precipitate by alcohol the resulting sodium cyanide, subject to

filtration and dry in vacuo the crystals obtained. The filtrate is added to a further amount of caustic soda, then the alcohol present is separated by decantation in order to recuperate as much as possible thereof. Besides requiring the intervention of a foreign reagent, namely alcohol, of which a certain quantity is lost, this method does not entirely dispense with evaporation, since it still is necessary to eliminate the water that accumulates as a result of the reaction:



The amount of water thus freed is 0.368 Kg. per Kg. of sodium cyanide which is not negligible.

The object of the present invention is to avoid the above inconveniences and to obtain a white, high-grade product without losing any of the materials used as reagents.

In accordance with this invention hydrocyanic acid is reacted with caustic soda in crystal form, in presence of as little water as possible. Under these conditions the caustic soda crystals ($\text{NaOH} \cdot \text{H}_2\text{O}$) are converted into sodium cyanide crystals ($\text{NaCN} \cdot 2\text{H}_2\text{O}$) without freeing any water, according to the reaction:



Thus is avoided the necessity of evaporating which, in former processes, was due to the continuous freeing of water in the course of the reaction.

In carrying out the new process, I dissolve at an elevated temperature anhydrous caustic soda in an amount of water proportioned to obtain a 60 to 69% NaOH concentration. The 69% proportion corresponds theoretically to the formation of crystals without excess water, but in actual practice a slight water excess is not only tolerable but is desirable in order to keep in solution, in presence of the cyanide, a little caustic soda that counteracts the tendency to browning.

The 60-69% caustic soda solution is cooled and crystallises at 18° C, forming hydrate $\text{NaOH} \cdot \text{H}_2\text{O}$. This crystalline mass, while subjected to cooling and continuous stirring, eagerly absorbs hydrocyanic acid, and is rapidly and completely neutralised.

When the crystals have been converted into sodium cyanide, the mass is drained to separate the small excess of water and caustic soda.

The cyanide crystals are white and they can be readily dehydrated by heating in vacuo to a temperature of 40 to 70°C. A white powder is obtained, which contains 98% or more of NaCN

and is suitable for use either as it is, or after being compressed into tablets.

Example

106 gr. of caustic soda are dissolved in 71 gr. 5
water at elevated temperature, towards 90°C,
then the mass is allowed to crystallise while cool-
ing and stirring. Neutralisation is effected by
68 gr. of hydrocyanic acid gas, while cooling and
stirring are continued in order to disperse the 10
heat evolved by the neutralising reaction. After

draining, there are collected 145 gr. of crystals
(NaCN.2H₂O) which, after being dehydrated in
vacuo, yield 82 gr. NaCN at 98%.

The mother liquor drained is added to the
caustic soda used for the next operation.

The process may also be carried out with hy-
drocyanic acid in liquor form, provided the tem-
perature be kept under its vaporising point
(26°C).

DAVID KUSMAN.

ALIEN PROPERTY CUSTODIAN

METHOD FOR THE MANUFACTURE OF PENCIL-LEADS

Otto Manfred, Brunn, Moravia; vested in the
Alien Property Custodian

Application filed June 7, 1940

The invention concerns the manufacture of pencil-leads (Graphite-clay-leads, copy-leads, coloured-leads, and others) and consists intrinsically therein that the preparation of the raw material by airing and the moulding of the plastic material with air take place in direct succession.

In the manufacture of pencil-leads, it is known how to remove the air contained in the lead material before and during the pressing of the lead. In contrast to this, according to the proposed method, both the raw material during preparation and the lead mass made plastic by compression and moulding are continually aired. And the manner of working is so regulated that preparation plus airing and moulding plus airing occur in a continuous, uninterrupted working procedure.

The diagram illustrated in schematic delineation an apparatus serviceable for the execution of the invention in which known elements and new constituents are united in a complete aggregate.

In the manner already known, a slantingly placed mixing drum 3 is connected at the upper end with the feeding funnel I by a clough 2 and at the lower end with the ejection apparatus 7. Besides that it is supplied with an air exhaust pipe 6 in the lower front face.

According to the invention, a screw-propeller 4 is placed on the drum axle near the low laid end of the same. The arrangement is so prepared that the screw-propeller is situated in the precincts of a holed or slit dividing-plate 5 which is inserted in the lower end of the drum between the drum and the ejection apparatus.

The execution of the invention, with the help of the delineated and described apparatus, occurs in the following way:

The raw material, compounded and prepared in the usual way, is caught by the entry clough 2 on the way through the feeding funnel I and is transported in bits to the mixing drum. In the working up of the material taking place

there, a continuous airing occurs while the mass is repeatedly broken up by the mixing implements and the air is sucked out of the drum through the pipe 6. Thereby not only the inner space of the drum is aired but also the material coming into the drum to be broken up. With the entry of the material, a new quantity of air is admitted to the drum.

The prepared material arriving at the lower end of the drum is caught there by the screw-propeller 4 and pressed continuously through the dividing-plate 5 in order to reach the ejection apparatus 7. On entering this apparatus, the prepared material is broken up into thin skeins corresponding to the passage's transverse diameter of the plate 5. Now the skeins of material are caught by the volute working in the ejection apparatus, assembled and extensively compressed. Before the assembling and compression, the skeins of material are aired again. For that purpose, there is an air drain, not shown on the diagram, which branches off from the ejection apparatus 7 underneath the dividing-plate 5 and empties outside the drum in the exhaust pipe 6.

On the lower end of the ejection apparatus 7 a matrice die 8 is arranged through which the material is squeezed in order to be pressed into staves of the lead strength in the usual way.

The manner of working described takes place in an uninterrupted procedure. The raw material conducted from the feeding funnel I is prepared in the drum 3 and worked up into plasticity in the ejection apparatus between the dividing plate 5 and the matrice die 8. During the course of work which forms a closed whole, the material is aired continually at the time it is being prepared. The material already prepared arriving at the matrice die 8 is in a state of being extensively aired and hence in a state of high compression and can be pressed through the matrice die with comparatively small pressure supply in order thereby to form the desired leads.

OTTO MANFRED.



PUBLISHED

O. MANFRED

Serial No.

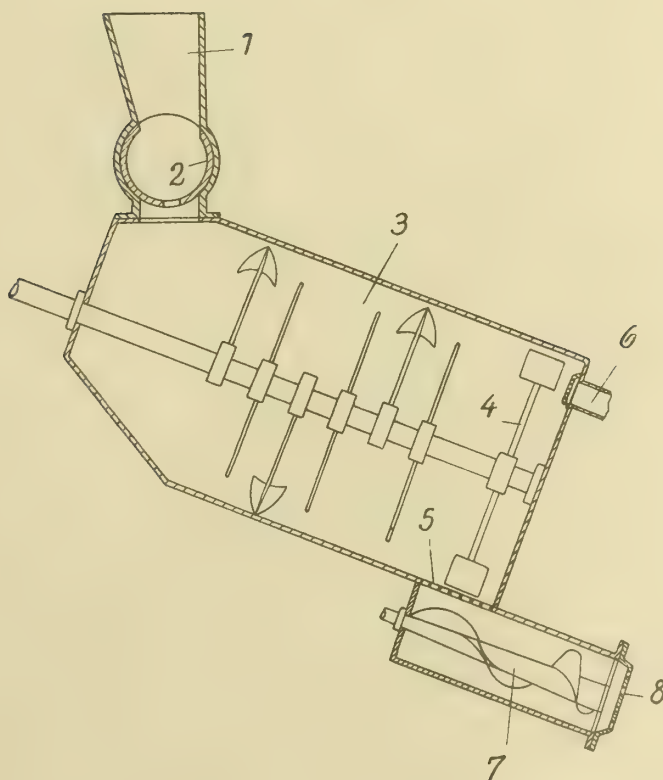
APRIL 27, 1943.

METHOD FOR THE MANUFACTURE OF PENCIL-LEADS

339,371

BY A. P. C.

Filed June 7, 1940



Inventor:

OTTO MANFRED

^{By}
Young, Emery & Thompson
ATTYS

ALIEN PROPERTY CUSTODIAN

THERMAL PUMP

Rudolf Böttcher, Hohen-Neuendorf B. Berlin,
Germany; vested in the Alien Property Custodian

Application filed June 8, 1940

This invention relates to a thermal pump, the volume of the working chamber of which is varied by a heated fluid. According to the invention the working chamber of the pump is separated from the fluid chamber by a resilient wall and the decrease in volume of the working chamber is brought about by heating the fluid and correspondingly increasing the pressure in the fluid chamber, but to increase the volume of the working chamber with the aid of a displacer cooperating with the fluid the latter is moved away from the zone of the heat source, so that as a result of the subsequent cooling the pressure in the fluid chamber is decreased. In this manner a pump is obtained with the aid of simple means in which the heat source for the auxiliary fluid may remain continuously in operation. For this reason the pump according to the invention lends itself particularly to such cases where a pumping effect is brought about without employing auxiliary means for putting the heat source in and out of operation. The arrangement according to the invention may, for instance, be employed to advantage as a pump for circulating the solution in absorption refrigerating apparatus of the continuous type, in which case the heat necessary for the operation of the pump may be supplied by any suitable heat source, such as, for instance, by the generator of the absorption apparatus. The arrangement according to the invention is so designed that the operating fluid of the pump is heated up to such an extent as to develop during the compression stroke of the pump vapors in order to attain the desired increase in pressure. The heating surface of the fluid chamber is preferably arranged at the upper end of the liquid chamber, the displacer in the central portion and the working chamber of the pump in the lower end of the liquid chamber.

In the accompanying drawings are shown two embodiments of the invention in diagrammatic form in which

Fig. 1 is a vertical sectional view of the heat pump according to the invention.

Fig. 2 shows an elevational view partly in section of a modified form of the heat pump.

Fig. 3 shows the heat pump as applied to an absorption refrigerating apparatus of the continuous type.

Referring to the drawings, 1 denotes the working chamber proper of the pump to which are connected a suction conduit 2 and a pressure conduit 3 in which are arranged the corresponding valves 4 and 5 respectively. The working cham-

ber 1 is separated from the space 7 to which is supplied the auxiliary liquid necessary to operate the pump, by a resilient wall 6. The space 7 is in open communication with the liquid container 8 through the openings 9 and 10. On the top of the container 8 is located a heated tube 11. A displacer 12 is arranged in the container 8 and serves to reverse the suction stroke or compression stroke. The container 8 is associated with the cover plate 15 of the working chamber 1 through a rocking lever system 13, 14. The two pairs of levers 13 and 14 are connected with each other by a spring 16 in the manner as shown in Fig. 1.

In the position of rest the chambers 7 and 8 are completely filled with auxiliary liquid up to the point A. By applying heat to the upper end of the liquid container 8, the liquid is caused to evaporate and the pressure produced thereby is transmitted to the working chamber 1 of the pump. The resilient wall 6 is compressed so that the liquid filling the working chamber 1 is forced out through the pressure conduit 3. Owing to the evaporation of the liquid, the latter assumes the level B. At the end of the compression stroke the displacer 12 is in the position B', C'. The arrangement is so dimensioned that the quantity of liquid contained between the points B and C is such as to fill up as soon as the displacer 12 has reached the position B', C' the space between the points C, C'. Upon the upward movement of the displacer, the auxiliary liquid in the container 8 is therefore out of the direct heat contact with the heating surface. Consequently, the vapors produced as a result of the heating of the liquid condense again on the air-cooled surface 17 so that the pressure prevailing in the spaces 7 and 8 decreases. Accordingly, a suction effect is exerted on the working chamber 1 of the pump which causes the space 1 to increase and draws in the liquid supplied through the suction conduit 2. As soon as the inclined position of the lever system 13, 14 is exceeded upon the movement of the cover plate 15 in the upward direction, the displacer 12 is brought again automatically into the lower position. In this manner the liquid is displaced again from the space C, C' in the upward direction so that it comes again into direct heat contact with the heating surface 11, and the compression stroke of the pump is then repeated. The form of the invention shown in Fig. 1 is characterized by the fact that the movable parts of the pump are completely surrounded by rigid walls. This is of particular advantage, since the pump is thus

completely protected against external mechanical influences.

Fig. 2 shows a somewhat modified form of the invention. 11 denotes the heated tube connected to the pump. 17 is the condensation surface of the pump. To the rod 14 of the rocking lever system is secured the plate 22 which forms together with the resilient wall 21 the lower closure of the working chamber 23 of the pump. The rod 14 is secured to the upper cover plate 25 of the working chamber 24 proper of the pump. 26 denotes a resilient wall of the pump and 27 the stationary bottom of the working chamber 24 to which are connected the pressure conduit 28 and the suction conduit 29.

Fig. 3 shows as an embodiment of the invention an absorption refrigerating apparatus of the continuous type provided with a pump 40, 41 designed according to the invention. This pump serves to circulate the solution. 31 is the generator of the absorption apparatus. The vapors developed in the generator 31 pass through a rectifier into the condenser 33, from where the liquefied refrigerant flows through a throttle valve 34 into the evaporator 35 arranged in the cooling chamber. The vaporous refrigerant then passes from the evaporator 35 into the air-cooled absorber 36. The vaporous refrigerant flows

through the conduit 43 and the conduit 39 wound around the part 41 of the pump. This part of the pump is thus additionally cooled by the cold refrigerant vapors. The conduit 42 serves to remove the liquid absorbent which might be entrained with the liquid refrigerant into the evaporator. 44 and 45 denote the conduits leading to the pump 40 and through which the rich solution is forced by the pump 40 through the heat exchanger 37 into the generator 31. The poor solution passes again through the conduit 46 and the float-operated valve 38 back into the absorber 36. The heated tube 48 of the part 41 of the pump extends into the passageway 47 of the generator 31 heated by a gas flame. In this case the pump is therefore heated by the waste gases of the generator.

The condensation surface of the part 41 of the pump is intensely cooled by the vaporous refrigerant flowing from the evaporator to the absorber. By suitably dimensioning the condensation surface the number of strokes of the pump may be varied at the same time in accordance with the quantity of vaporous refrigerant.

To create the desired pressure within the pump suitable solutions may be employed as an operating fluid.

RUDOLF BÖTTCHER.

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APRIL 27, 1943.

BY A. P. C.

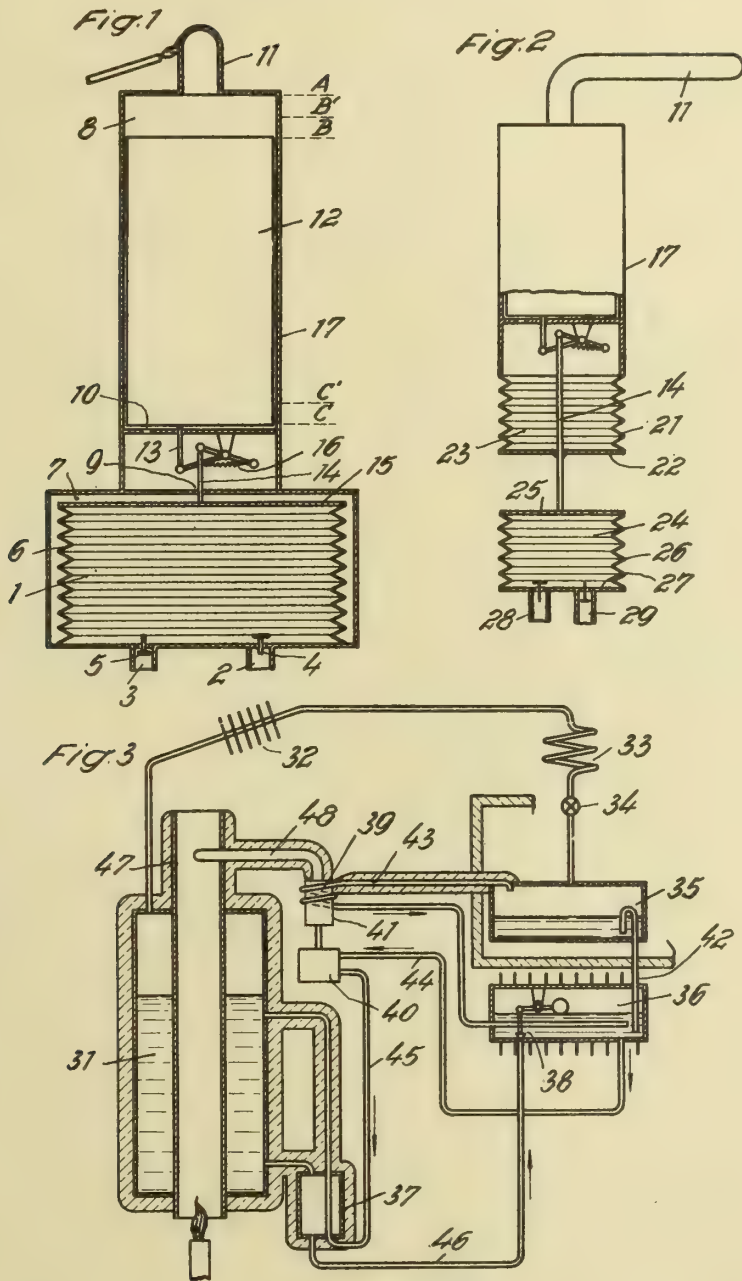
R. BÖTTCHER

THERMAL PUMP

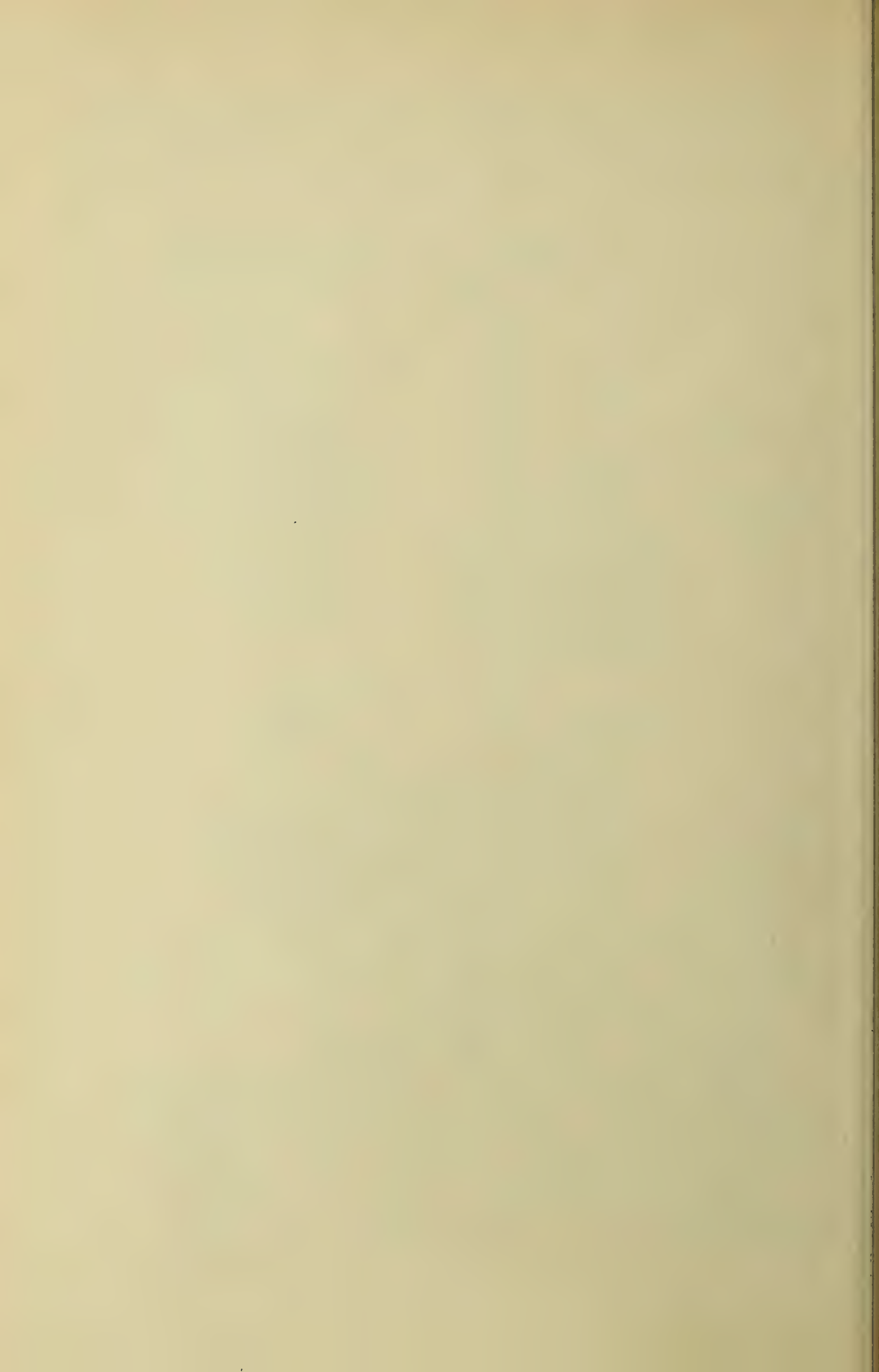
Filed June 8, 1940

Serial No.

339,562



Inventor:
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Atty. 418



ALIEN PROPERTY CUSTODIAN

METHOD OF PROTECTING PLANTS AGAINST FROST

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vested in the Alien Property Custodian

No Drawing. Application filed June 13, 1940

The present invention relates to a method of protecting plants against frost.

To protect plants against the danger of frost it has already been proposed to smear or spread upon the plants foams of aqueous liquids or of solutions of salts which reduce the freezing point or develop heat during crystallizing out. These foams consist, as far as their volume is concerned, largely of air. The liquid wall between the individual air bubbles is thin in proportion to the diameter of the air bubble. According to the magnitude the volume of air is 10-25 times as large as that of the liquid in these foams. With a proportion of 10 only an average wall thickness of the cells of about 0.01 to 0.02 mm is calculated for a foam the individual cells of which have a diameter of about 1 mm. At points where the walls of two or more cells touch each other, i. e. at the edges and corners, accumulations of liquid are formed, whereas towards the middle the foam foils become colloiddally thin. This is obtained by the fact that in the liquid, i. e. the water, a foam former or producer is solved which reduces the surface tension of the liquid and thereby allows the formation of liquid films of such small wall thicknesses. If the outside temperature reaches the freezing point, the outermost layer of the foam enveloping the plants first solidifies. This freezing process very slowly proceeds to the plant itself. A firmly coherent coating, however, is not formed. It has been shown, moreover, that the foam solidifies in the state of snow. This snow is finer, i. e. of smaller crystals, than ordinary snow. As is well known snow neither forms a hindrance for the breathing nor for the other processes of the plant. It is remarkable that on rethawing the foam assumes again its original state.

In practically carrying out the method according to the invention it has been found that in some cases a success is obtained, whereas in an inexplicable manner this method often failed, particularly in connection with plants which are highly sensitive against frost.

Now, the main object of the present invention is to obtain in all cases a positive success with such foams. This is obtained by using foams the freezing point of which lies as near as possible to 0° C.

If for instance a plant enveloped with a foam was subjected to an outside temperature of -10° C, it took 1-2 hours until the temperature of the foam sunk to the freezing point. The temperature remained for a further 1-2 hours at the freezing point until then it slowly sunk further.

The damages caused by frost mainly are due to the fact that the liquids in the tissue of the plants, mostly consisting of water, freeze and the ice formed thereby prevents the circulation of the juice and, moreover, tears the tissue by its expansion. Now, these liquids do not consist of pure water, but of aqueous solutions the freezing point of which lies lower than that of pure water, i. e. lower than 0° C. A portion of these liquids, representing less concentrated molecular solutions, has a freezing point which lies a little below 0° C. If the temperature is below this freezing point these liquids freeze to ice. If other liquids still maintain their liquid state such partial ice formation is already sufficient to injure or even kill the plant. Whereas, therefore, a temperature of 0° C cannot yet be harmful to the plant, the freezing of some liquids soon starts on sinking of the temperature. At a temperature below -1° for instance such a large portion of the liquid is frozen already that the plant is seriously injured or killed.

This proves that the protecting effect of a foam is no longer present if the freezing point of the foam lies below the critical temperature of the plants to be protected. If first of all during sinking of the temperature of the foam to the freezing point, a certain protecting effect is obtained, just the further protecting effect of the frozen foam is rendered illusory, if indeed the plants are protected against further sinking of the temperature by the frozen foam, are, however, already in a harmful range of temperature.

Very small differences are hereby a matter of consequence and, therefore, it is within the essence of the present invention that the freezing temperature of the foam forming liquid lies as near as possible the freezing point of pure water.

On the basis of this knowledge it has been proved to be wrong to add any salts to the liquid. As is well known each kind of additional of soluble substances causes a depression of the freezing point. By the heat abstraction under partial crystallisation according to the French patent 840,346, the freezing point is more slowly reached indeed, but this freezing point lies at a temperature of below -1° to -3°, so that then the plants to be protected are already within the dangerous range.

In practice the waters available for the foam formation must be known in respect to this. It is only necessary to have the freezing point tested at a suitable point of time to know which water is to be used for the formation of the foam in the moment of danger by frost.

It has been found that water may be rendered suitable for this method also by chemically eliminating therefrom solved substances. This purification also may be obtained by freezing out, or distillation and condensation.

Ordinary snow- or rain-water is particularly suitable for this method. If such water is available in cisterns or collecting tanks it is the best water to be used for this purpose. Relatively small quantities of water are required. The foam has a volume of 15-20 times. By adding rain- or snow-water to other water the solved substances may be diluted so far that the freezing point will not be too far below 0° C.

For the production of foam in large quantities the well known apparatus, serving for fire extinguishing by foam, are sufficient. For smaller quantities of foam more simple stirring apparatus, filter tubes and so on may be used.

Saponine and the various other well known substances may serve as foam formers or producers which, when added in small amounts to the water, effect the foaming. In this case also care is to be taken, that the contents of foam formers or producers are so chosen as to add as little as possible in depressing the freezing point.

Example

Three groups of 10 azaleae covered with foam were subjected to a temperature of -10° C. In group 1 each plant was enveloped by foam consisting of rain-water containing 0.5% of saponine. In group 2 each plant was enveloped by a foam consisting of tap-water containing 0.5% of saponine. In group 3 each plant was enveloped by a foam consisting of well-water containing 0.5% of saponine. The rain-water, the tap-water and the well-water each containing 0.5% of saponine had freezing points of -0.2°, -0.5° and 1.5° C respectively. In the moment the three foams were applied to the plants they had a temperature of 12° C. Then it took about one hour until the foams enveloping the individual plants reached the freezing point measured at the plant. On this freezing point the foams were maintained for about 2 hours, whereby the foams gradually solidified to a coherent snow. Then the plants were brought into a room again hav-

ing a temperature of several degrees above the freezing point. It was found that after thawing and removing of the foam no alteration was to be ascertained with the first group of plants. The plants of group 2 were partially attacked, but soon recovered. All plants of group 3 were attacked. Four plants were killed by the frost.

It was found, moreover, that the heat protecting effect of the foam might considerably be increased if oils or fats of mineral, vegetable or animal origin were introduced into the foam in the form of small drops. For these purposes it is necessary that in the moment of the foam formation the oil or fat is emulsified in the water to be formed to foam which also still contains the foam former, for instance 0.5% of saponine. This may preferably be effected by combining the dispersion of the air in the water by pressing in the air by way of porous walls stirring or other well known methods with the emulsification of the oil. As far as the oils and fats are concerned the condition is to be fulfilled that they contain no water soluble constituents which may cause a depression of the freezing point. In a rather simple manner this may be effected by previously stirring with water the oil to be used, whereby the soluble constituents pass into the water. Only if it is absolutely sure that no soluble substances in the oil depressing the freezing point are introduced into the water to be foamed, the formation of the foam may take place.

So for instance an acid containing paraffine oil was introduced into a foam in the manner described above. 50 gr of paraffine oil were strongly stirred with 1 liter of rain-water containing 5 gr of saponine serving as foam former. A solid foam with embedded drops was formed having a freezing point of 0.9° C. If the paraffine oil was sufficiently freed from the acid by previously treating the oil with water, the freezing point of the foam still was 0.2° C. Tests carried out with azaleae in the manner described above proved that, when using the first mentioned foam, some of the plants were damaged or injured, and that, when using the last mentioned foam, the plants after treatment were fresher than after treating with water containing no paraffine.

LEO LÖWENSTEIN.

ALIEN PROPERTY CUSTODIAN

METHODS OF SEALING ELECTRIC DISCHARGE VESSELS

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in the Alien Property Custodian

Application filed June 14, 1940

As is well known the casing or envelope of electric discharge vessels may be composed of two parts sealed, welded or soldered together, thus insuring the necessary vacuum tightness, or a cover may be arranged which softens when heated. However, the heat employed to such end is able to affect the electrode system and also constitutes an undesirable expenditure of energy. Such a cover may comprise an insulating body and a glass disc fixed to this by melting. In the case of a metal bulb forming part of the discharge vessel such glass disc must be heated two times in general and by two sources of heat acting one after the other. This adds to the cost of manufacture. Where such cover also serves to support the electrode system a special device is necessary for manufacturing it in a separate operation while in another operation the leads to the electrode system are sealed into the cover. Still another operation is necessary to cool down the cover or support so obtained. After all these operations have been finished the electrode system is fitted to the cover. The cover is then slowly heated and is thereupon sealed into the bulb of the discharge vessel. In the case of a metal bulb this must be heated to a temperature that depends upon the softening point of the glass forming part of the cover. Such heating is necessary in order to firmly unite the metal bulb and glass together. Even with the usual soft lead glass that part of the metal bulb which is to be engaged by such glass must be bright red hot, that is, must be heated to at least 800° C.

Temperatures lower than this would suffice if a sealing glass still softer than lead glass were employed. However, the lower the melting point of the glass the greater are the difficulties encountered when manufacturing the said assembly of insulating body and glass disc by means of the aforesaid device. In fact, the glass disc, when melting it onto the insulating body, loses its plane shape the more readily the easier it is to soften. The same difficulties arise when pressing an extremely soft glass onto the insulating body and arise also in other methods of providing the insulating body with a glass disc.

The invention described hereafter does not require the insulating body or cover, which may also serve to support the electrode system and preferably is of a ceramic material, to be united with any glass body intended to act as sealing material. In fact, the invention provides for applying a sealing glass to both the insulating body and the bulb of the discharge vessel, the bulb

preferably having a metallic flange for this purpose.

In this way the invention enables the use of sealing glass that may be of any desired degree of softness. It does away with all the drawbacks due to low melting sealing glass and yet insures that all the advantages thereof are obtained. For instance, metal parts to which the sealing glass is applied need not be heated to temperatures by which the electrode system is affected. Cooling means for the electrode system hence need not be arranged. These advantages exist especially if the metal parts consist of an alloy of iron and at least 15% chromium. If in addition the sealing glass has the property of solving the oxides this alloy forms then the metal part has to be heated to a temperature not higher than about 40% of the temperature usually necessary for the provision of glass seals. Accordingly, the cost of manufacture is considerably reduced and the time taken by the manufacture of a discharge vessel can be rendered so short as to enable a mass production difficult to surpass.

According to the invention a flow of vitreous material is directed against the joint or spot to be sealed, as will be understood from the following description, reference being had to the accompanying drawing, in which

Fig. 1 is a partially diagrammatic sectional elevation showing one form of apparatus for effecting the invention, Fig. 2 is a sectional detail view, and Fig. 3 represents a section on line 3—3 of Fig. 2.

1 denotes a sort of melting crucible equipped with heat accumulating enlargements 2 and cooling ribs 3. The bottom part 4 of the crucible carries a squirting die 5. This die and the lower part of the crucible are located within an electric heating coil 7 which is provided with an insulating jacket 8. 6 denotes the vitreous material contained in the crucible and liquefied therein by the heat produced by coil 7. In case the parts 1, 4, 5 are of metal they are covered with layers of asbestos 9, whereby coil 7 is prevented from undergoing short-circuits. The upper part of the crucible is fitted with a cylindrical cooling vessel 10 arranged to be traversed by water. The cooling so effected enables the upper opening of the crucible to be closed by means of a greased plug 11 which may be somewhat conical, as shown, and is secured in the crucible by a bayonet joint 14. The plug 11 is hollow and has an inspection window 12 hermetically fastened therein. Through this window the behaviour of the sealing material 6 may be observed.

The space 15 above the vitreous material 6 may be connected either with a vacuum pump 32 or with a compressor 18. Pump 32 is associated with a store vessel 33.

The vacuum in space 15 is adjustable by means of a cock 16 and a valve 17 provided with a small air opening.

The pressure in space 15 is adjustable with the aid of a cock 19 and a valve 20, this being intended for fine regulation. The air from compressor 18 enters the space 15 through a conduit 25, a control valve 21 and a conduit 29.

Valve 21 is constructed as shown in Figs. 2 and 3. 22 denotes a stationary disc provided with bores 23 which are arranged in circular relation to each other. The bores 23 communicate with a chamber 24 to which the conduit 25 is connected. A disc 26, fitted with bores 27, is hermetically seated in the disc 22. The bores 27 communicate with a chamber 28 to which the conduit 29 is joined. On the side remote from chamber 24 the discs 22, 26 are flush with each other, and the flush surfaces thereof are polished. A control disc 30, having a U-shaped channel 31, is arranged to contact with these surfaces and to rotate on them. Channel 31 serves to interconnect the bores 23, 27 in such a manner that the compressor 18 is periodically connected with the space 15. The air pressure which thus enters the crucible 1 acts to force the liquefied material 6 through the die 5 during predetermined intervals of time. The duration of these depends on the speed with which the disc 30 is rotated. The flow of vitreous material thus ejected is directed against the joint or spot, not shown, to be covered therewith. To such end the device is preferably so positioned that the die 5 is located above such joint and by preference vertically to this.

The die 5 should be interchangeable. In the case represented it is screwed into the bottom part 4 of the crucible.

The opening of the die 5 is so calculated that the material 6 when in its viscous state cannot leave the die whereas when the material 6 is in its liquid state it will be able to leave it by drops. By suitably calculating the opening and shape of die 5, the pressure in space 15, the viscosity of the material 6 and the distance between die 5 and the joint or spot to be sealed the material 6 will leave the die with a speed by which it is caused firmly to adhere to the joint against which it is ejected. Where a metal flange of the bulb forms part of such joint this flange need not be heated to any high temperature. The material 6 is nevertheless as intimately and firmly united with this flange as if the latter were red hot and highly oxidized. The heating of the flange is effected some instants before accomplishing the sealing operation and conveniently is performed with the aid of high frequency eddy currents. The insulating body or cover when made of ceramic material need not at all be heated, this being due to the roughness of its surface and to its porousness.

The composition of the material 6 should be such that this is easy to liquefy and quickly solidifies when impinging upon the respective joint.

A suitable construction of the die 5 or an arrangement of points, or both these expedients may cause the material 6 to be converted into spray, and the means for mounting such points or the like may also be arranged to cover the current leads for coil 7.

Instead of inserting the finished material 6 into the crucible the component substances thereof may be arranged in the crucible in order to be heated by the coil 7 and thereby to produce the vitreous material.

RUDOLF SCHARFNAGEL.

PUBLISHED

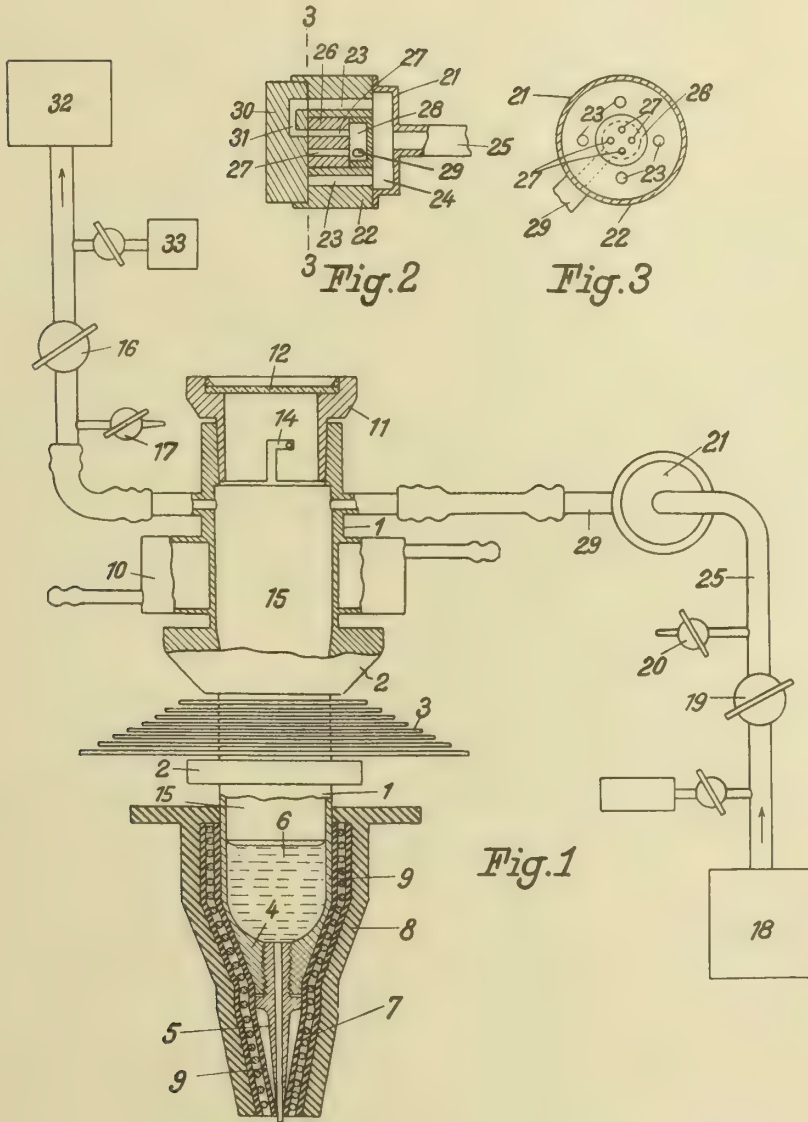
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APRIL 27, 1943. METHODS OF SEALING ELECTRIC DISCHARGE VESSELS 340,441

BY A. P. G.

Filed June 14, 1940

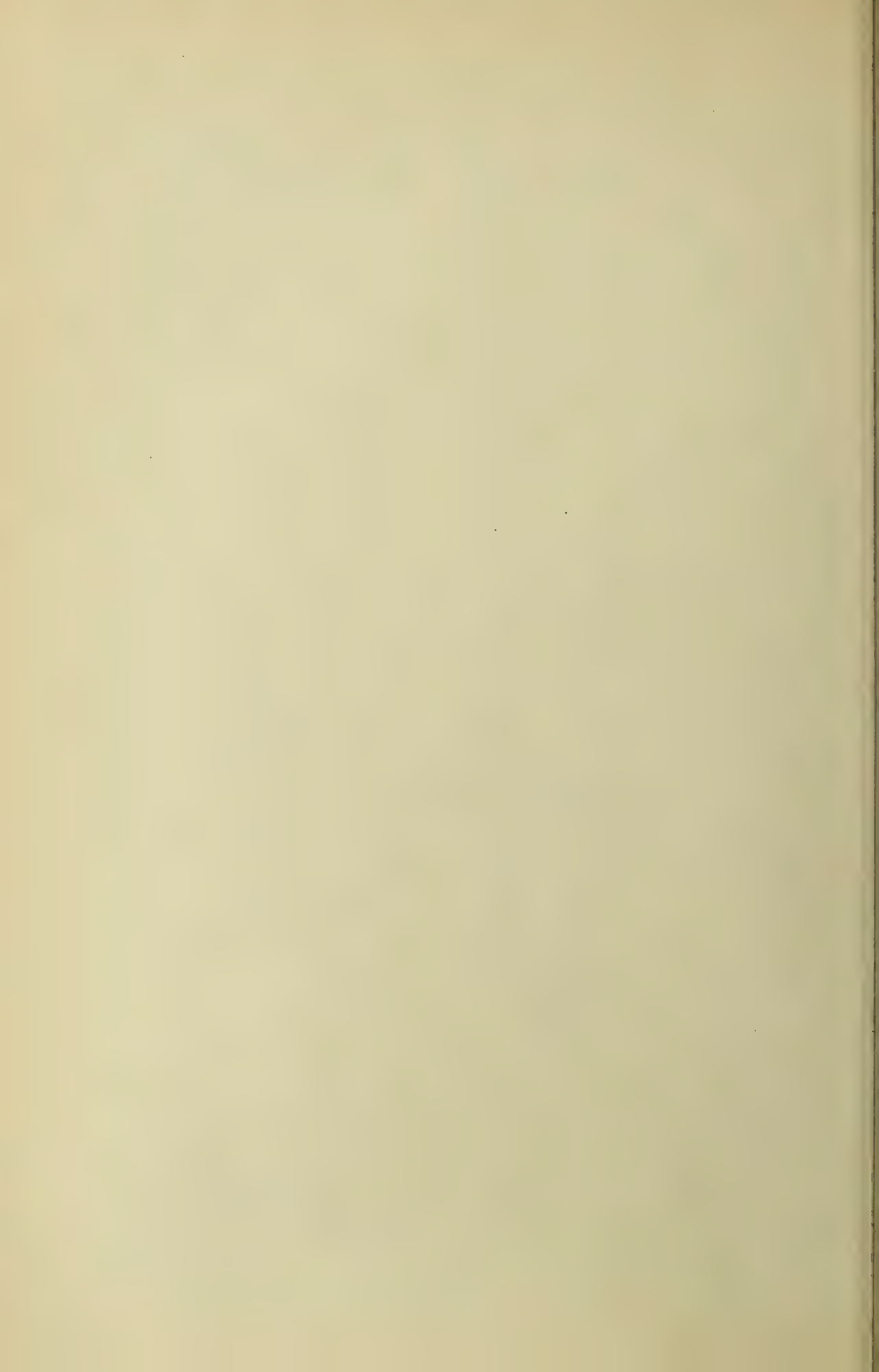


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ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF ARTIFICIAL FILAMENTS, FIBERS AND FOILS

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No Drawing. Application filed June 18, 1940

This invention relates to new compositions of matter and more particularly to long-chained paraffins and filaments, fibers, foils, films and the like prepared therefrom.

It is known to prepare paraffins by hydrogenation of carbon monoxide. Also by direct hydrogenation of coal or coal-hydrocarbon mixtures it is possible to obtain paraffins of various chain lengths. When hydrogenating hitherto under pressure, one had in view benzines and paraffins with short chains only, as long-chained high molecular products were of no commercial value. In the laboratory there were prepared already paraffins of very large chain length containing for instance 700-900 carbon atoms. Such paraffins are obtained in relatively good output by hydrogenation of carbon monoxide with ruthenium as catalyst (see "Brennstoffchemie", Volume 19, No. 12). These paraffins have melting points of above 130°C and may attain a chain length of more than 700 carbon atoms, if the hydrogenation is properly directed. Technical importance, however, was not obtained by these products.

This invention has as an object the preparation of new and valuable compositions of matter, particularly fiber-forming materials.

A further object is the preparation of filaments, fibers and the like.

Still a further object is the preparation of films, foils and sheets for various purposes.

Still further objects will become apparent as the description proceeds.

It has been found that long-chained paraffins having a chain of at least 400 carbon atoms and being won from coal or carbon monoxide by hydrogenation under pressure, may be worked up into valuable fibers, filaments, ribbons, films, foils and the like. The fibers, filaments, foils, films thus obtained show good tenacity. They are completely water-repellent and of good resistance towards most chemicals. A special advantage of these fibers lies in the very light specific weight, which is lower than that of the usual textile fibers from cellulose and still lower than that of natural silk.

The fibers may be prepared by spinning from the solution. Preferably there are used highly concentrated solutions of the high molecular paraffins in organic solvents, such as toluene or tetrahydronaphthalene. The solvent may be removed either by a precipitating bath or it may be evaporated according to a known dry-spinning-process. The fibers obtained according to this spinning process are advantageously subjected

still in a plastic state to an extensive drawing process, in order to increase their tenacity.

The long-chained paraffins melt without decomposition and may be spun therefore directly from the melt. Especially useful for the spinning of fibers directly from the melt is the process according to U. S. Patent application Ser. No. 220,236, filed July 20, 1938. According to this process the material is chemically fed to the spinning nozzle in a solid state and then continuously molten near the nozzle corresponding to the applied speed and pressed through the spinning nozzle in a molten state. It has been found that fibers spun in this way directly from the melt may be oriented at a temperature below their melting point by cold drawing, i.e. the fibers possess a very high plastic elasticity which may be eliminated to any extent by drawing at ordinary temperature ("cold drawing"). In this way the fibers may be drawn into very fine filaments. With the cold drawing there is connected an orientation along the fiber axis which increases the tenacity of the fibers considerably. Similar phenomena have been observed on other synthetic fibers. Since, however, fibers from vinyl polymers, for instance polyvinyl chloride, do not show it, the possibility of an orientation of the fibers in high molecular paraffins is very surprising.

The fibers according to the present invention are very suitable for all textile purposes, in which, however, fastness towards high temperatures is not so much required. The fibers are still fast to boiling. The softening point lies at above 100°C, the melting point at above 130°C. If high molecular paraffins with a carbon chain of 700-900 and more carbon atoms are used, not only the fastness of the fibers towards high temperature is increased considerably, but also their tenacity. With molecular weights above 10,000 the tenacity of the fibers reaches that of cotton and natural silk. At still higher molecular weights the tenacity of cotton and natural silk is even surpassed.

Films and foils may also be cast from solutions or from the melt or may be drawn in a plasticized state. A further possibility for the manufacture of sheets consists in a method by which they are machine-turned from blocks. During the manufacturing process there may be added to the paraffins modifying agents, such as plasticizers, pigments, fillers and the like.

As to the foils the so called cold drawing is preferably executed in several directions, whereby in the foils an orientation of the molecules in different directions is produced, thereby improving

the tenacity and elasticity of the foils. It is also possible to effect this orientation of the molecules by rolling. A relatively thick foil is rolled for that purpose at ordinary temperature, until its length in one direction has been increased three to five times. Also such foils show excellent tenacity.

The fibers obtained according to the new process are very suitable for technical purposes on account of their resistance towards chemicals. By a thermoplastic forming process it is therefore possible to produce technically valuable filters consisting of one or several fiber layers. The fibers are also completely insensitive towards rotting and are therefore suitable for electric insulation, fishing nets, ropes, sails and similar structures. The fibers and filaments according to the present invention may also be used for folding hoods of motor cars and similar purposes. Either mechanically or by swelling and afterwards shrinking a permanent crimp may be imparted to the fibers. They are then especially suited as substitute for wool and may be subjected together

with wool and other artificial fibers, if desired, to a felting process. For the production of textile fibers the endless ribbons may be converted into staple fibers by tearing or cutting in the usual way.

5 The application of the films and foils according to this invention is very various. The material prevents extensively diffusion of moisture through the foils. It is therefore most suitable for wrapping foils, especially for food products. 10 The material may also serve as support for photographic films and may be useful as carrier for the light sensitive substance. Most remarkable is the low degree of swelling capacity in water. 15 The electric properties of the foils make it possible to use them for electric insulations, for instance for cables, condensers and the like. It is also within the scope of this invention to use them as tubes, such as skins for sausages which are 20 technically manufactured in large quantities. The foils may also be used as binding sheets for shatter-proof-glass.

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ALIEN PROPERTY CUSTODIAN

WELDING BURNER FOR THERMOPLASTIC MATERIALS

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Application filed June 19, 1940

The present invention relates to a process for uniting or consolidating pieces of thermoplastic materials by welding and to a welding burner for the purpose in question.

The term "thermoplastic materials" comprises various materials occurring in nature or prepared by synthesis which are non-plastic at ordinary temperature and are capable of being converted into a plastic sticky or fluid state in the heat. Pieces of such materials are capable of being united or consolidated by contacting the same with a stream of hot gas the temperature of which is above the softening point of the materials to be welded. Such materials are, for instance, polyvinyl compounds such as polystyrol, polyvinylchloride, products of the mixed polymerization of vinylchloride and vinylacetate or acrylic acid alkyl esters, furthermore, cellulose nitrate or cellulose acetate and also the so-called condensation superpolymers such as linear polyamides (for instance those prepared from adipic acid and 1,4-tetramethylenediamine) or linear polyurethanes. The welding of such materials has been effected up to the present by means of an apparatus (shortly called "burner") which consists of a metallic coil provided with an exit nozzle, the coil being heated from outside by gas flames or electrically, a gas stream being passed through the heated coil and then contacted with the materials to be welded. Such burners suffer from the disadvantage of being very complicated and of being handled only with difficulty. Such inconveniences are due to the fact that the metallic coil makes the burner heavy whereas the user is disturbed by the various conduits for the gas stream and for the heating devices. All such conduits must be directly connected with the burner as the heating coil must be arranged near the exit nozzle for the gas stream.

It is the object of our present invention to do away with these disadvantages and to develop a burner for thermoplastic materials which can be easily handled and which allows one to control the temperature of the gas stream in a simple and convenient manner. Other objects will be apparent from the following description and claims.

Our new burner comprises in its simplest form a tube provided with an exit nozzle and a catalyst which is capable of effecting reaction between oxygen and a combustible gas, this catalyst being arranged near the exit nozzle, and preferably with a handle. The welding by means of such burners is effected in the following manner: An oxygen containing gas such as oxygen itself or air is mixed with a combustible gas in such a pro-

portion that the mixture is unflammable. This gas mixture is passed through the said burner, the oxygen reacting with the combustible gas when coming into contact with the catalyst so that the gas stream leaves the exit nozzle in a hot state without burning. The hot gases are then contacted with the thermoplastic materials to be welded. Burners of the character described can be easily handled as they are light in weight and as they require only a single feed pipe, viz. for the mixture of the oxygen containing gas and for the combustible gas. As a matter of fact, our new burners may also be provided with two separate feed pipes, one for the oxygen and the other one for the combustible gas, the lighter weight per se of such burners representing a distinct advantage over the state of the art.

The catalyst may consist for instance of platinum or palladium and also of nickel, particularly in a finely divided state. Palladium wool has proved to be particularly suitable for the purpose in question. On starting the burner the catalyst may be heated for a moment, for instance, by contacting the tube with a gas flame from the outside in order to bring about or to accelerate its becoming effective. Such a preheating can also be effected by means of a wire which may be wound round or otherwise be contacted with the catalyst and which may be heated in any convenient manner. The preheating, if any, is stopped as soon as the catalyst has become sufficiently effective. The oxygen containing gas is preferably air, though other mixtures or pure oxygen are by no means excluded. As combustible gas there may be employed, for instance hydrogen, carbon monoxide, acetylene or mixtures containing such gases such as lighting gas.

An outstanding feature of our new burners is to be seen in the fact that the temperature of the gas stream which is leaving the exit nozzle can be regulated in a most simple manner by regulating the proportion of the oxygen and the combustible gas, always provided, however, that the mixture does not become inflammable. The burner may be provided with a device for measuring the temperature, for instance, with a thermostat which may be connected, for instance, by means of an electrical contact, with the valve for regulating the proportion of the oxygen and the combustible gas. In this manner the desired temperature can be maintained automatically. In a similar manner the preheating device can be switched out automatically.

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THE HISTORY OF THE UNITED STATES

OF THE

AMERICAN PEOPLE

The history of the United States is a story of the growth of a nation from a collection of small, isolated colonies to a powerful, unified country. It is a story of the struggles of the people to establish a government that would protect their rights and promote their welfare. It is a story of the triumphs of the American spirit and the sacrifices of the American people.

The story begins with the first settlers who came to the New World in search of a better life. They found a land of opportunity, but also a land of hardship. They had to fight for their survival against the elements and the native Americans. They had to build a new society from scratch, one that would be based on the principles of freedom and democracy.

As the colonies grew, they began to assert their independence from England. They demanded the right to self-government and the right to be taxed only by their own representatives. They fought the American Revolution, a war that was fought for the principle of liberty. The revolution was a success, and the United States was born.

The new nation was faced with many challenges. It had to establish a government that would be strong enough to protect its interests, but also one that would be respectful of the rights of its citizens. It had to build a national identity, one that would unite the people of the different states. It had to overcome the economic difficulties of the early years and build a strong economy.

The United States has come a long way since its founding. It has become a world power, a leader in the field of science and technology, and a champion of human rights. It has faced many challenges, but it has always emerged stronger and more united. The history of the United States is a testament to the power of the American people and the values they stand for.

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F. R. MEYER ET AL

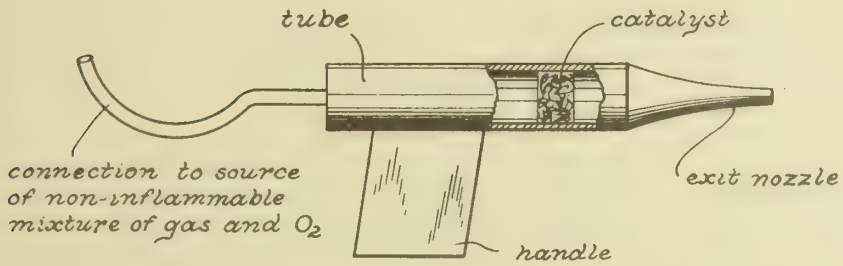
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APRIL 27, 1943. WELDING BURNER FOR THERMOPLASTIC MATERIALS

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BY A. P. C.

Filed June 19, 1940



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ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF PROTHESES

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No Drawing. Application filed June 22, 1940

This invention relates to a process for the production of prostheses and more specifically for the production of prostheses for dental purposes in which process polymerized and polymerisable organic compounds are used, for example polystyrol, polyvinyl and polyacryl compounds. Of the polyacryl compounds the most important are polymethacrylic compounds.

The invention is an improvement of those processes in which the polymerized and polymerisable organic substances are worked up by pressing them to the desired shape in a di-part mold manufactured of water-containing masses, for instance a di-part gypsum mold. In such processes, the material is brought into the mold either when in a solid, already polymerized state or as a mixture of a solid polymerisate and a liquid compound being either monomeric or only partially polymerized but capable of being hardened by polymerisation. In the first case, the pressing of the mass is effected at temperatures at which the solid substances become thermoplastic, and in the second case, at temperatures at which the paste from polymeric and monomeric compounds is polymerized thoroughly.

Particularly, the invention relates to a process for the production of prostheses from polymerized and polymerisable materials in which a mixture of solid polymeric and liquid monomeric or only partially polymerized acryl compounds, for example, methyl methacrylate, is polymerized. But the invention may also be employed when working up other polymerisable organic compounds to prostheses.

Amongst the hydrophobic organic compounds, those have proved as specially adapted to fulfill the intended purpose which diminish the viscosity of the paste of artificial resin; for it has been found that, if the viscosity of the pasty mixture from a polymerisate and a monomeric polymerisable substance is diminished, the mixture flows easier, presses more closely to the gypsum mold and eliminates thereby the formation of bubbles that cause the entrance of water and, therefore, discoloring of the mass. Furthermore, it has been found that even such hydrophobic organic substances are apt for the intended purpose that change the surface tension and show capillary working in the mixture of artificial resin. These substances cause a closer communication between the artificial resin and the mold and prevent, therefore, the penetration of water.

Substances that improve the properties of the polymerisate and the polymerisable material are, for example: carbocyclic, aromatic and hydroaromatic, but also aliphatic hydrocarbons, especially such hydrocarbons bearing a side-chain, as for instance a residue of methyl, ethyl or propyl. Instead of hydrocarbons such derivatives thereof may be used in which one or several atoms of hydrogen on the hydrocarbon skeleton are substituted by groups that are chemically not very active. In general, the effect attained thereby is increasing parallel to the molecular value. For instance, an addition to benzol is not very effective, an addition of naphthalene more effective, and an addition of anthracene yet more effective. 2 parts by weight of an addition of anthracene produces the same effect as 15 parts by weight of an addition of naphthalene.

The said carbocyclic compounds may be substituted by heterocyclic mother substances and compounds deriving therefrom by substituting atoms of hydrogen by groups being chemically not very active.

Groups being chemically not very active are, for example: the keto-group, the hydroxyl-group and the ester-groups.

These additions may be made each per se or several at the same time. It may be expedient to add two or more additions, for instance for the reason that it is possible, in this case, to graduate

from polymerized and polymerisable organic compounds.

The above objects are accomplished, according to the present invention, by adding hydrophobic organic compounds that are soluble in the starting material of the artificial resin or that are at least emulsive therein.

Amongst the hydrophobic organic compounds, those have proved as specially adapted to fulfill the intended purpose which diminish the viscosity of the paste of artificial resin; for it has been found that, if the viscosity of the pasty mixture from a polymerisate and a monomeric polymerisable substance is diminished, the mixture flows easier, presses more closely to the gypsum mold and eliminates thereby the formation of bubbles that cause the entrance of water and, therefore, discoloring of the mass. Furthermore, it has been found that even such hydrophobic organic substances are apt for the intended purpose that change the surface tension and show capillary working in the mixture of artificial resin. These substances cause a closer communication between the artificial resin and the mold and prevent, therefore, the penetration of water.

Substances that improve the properties of the polymerisate and the polymerisable material are, for example: carbocyclic, aromatic and hydroaromatic, but also aliphatic hydrocarbons, especially such hydrocarbons bearing a side-chain, as for instance a residue of methyl, ethyl or propyl. Instead of hydrocarbons such derivatives thereof may be used in which one or several atoms of hydrogen on the hydrocarbon skeleton are substituted by groups that are chemically not very active. In general, the effect attained thereby is increasing parallel to the molecular value. For instance, an addition to benzol is not very effective, an addition of naphthalene more effective, and an addition of anthracene yet more effective. 2 parts by weight of an addition of anthracene produces the same effect as 15 parts by weight of an addition of naphthalene.

The said carbocyclic compounds may be substituted by heterocyclic mother substances and compounds deriving therefrom by substituting atoms of hydrogen by groups being chemically not very active.

Groups being chemically not very active are, for example: the keto-group, the hydroxyl-group and the ester-groups.

These additions may be made each per se or several at the same time. It may be expedient to add two or more additions, for instance for the reason that it is possible, in this case, to graduate

the softening effect corresponding to the individual requirements.

The special effect of the process according to the invention is attained when using a mixture from a solid polymerisate and a liquid monomeric or partially polymerized but polymerisable substance, particularly compounds of the vinyl and acryl group, preferably methacrylic acid esters

For instance, substances, as paraffine, vaseline, octane, aceto-acetic acid ester, colophony, turpentine oil, benzol, toluol, xylol, meistylene, cumol, benzyl alcohol, salicylic acid, naphthaline, diphenyl, diphenyl methane, benzophenone, anthracene, ethyl ester of phenylacetic acid, benzyl ester of phenylacetic acid, diethyl ester of phthalic acid and tricresyl phosphate, are added to the starting materials of the artificial resins, according to the invention. The additions of these hydrophobic substances to the starting materials of the artificial resin amount to 0,1 to 40%, in general 2 to 15% of the starting materials.

The adding of the substances avoiding discoloring to the mixture of solid and liquid acrylates takes place when the substances of solid and liquid acrylates are mixed or, more preferably, before the mixing. In the latter case, solid additions, for example naphthaline, are suitably added to the solid polymeric acryl compound, and liquid additions, for example mesitylene, are suitably added to the still liquid monomeric acryl compound.

Besides the additions according to the invention, also known additions common in the art, such as polymerisation catalysts, softeners, coloring matters, and fillers may be added to the acryl compounds.

In order to illustrate the invention the following examples are given:

Example 1

85 parts of solid polymerized ester of methyl methacrylate and 15 parts of naphthaline are mixed with such a quantity of liquid monomeric ester of methyl methacrylate as to form a tough paste. This paste is pressed in a di-part gypsum mold as commonly used for the production of dental rubber prostheses, the two parts of the mold are pressed together and the filling is polymerized by putting the mold into boiling water, for half an hour. After polymerisation, the prosthesis is removed from the gypsum mold and then finished and polished.

In order to facilitate the removal of the casting from the mold and the finishing of the prosthesis it is advisable to line the walls of the gypsum mold, before the mixture is embedded, with an organic varnish or with waterglass, particularly waterglass of a special alkaline strength. This lining facilitates the removal of the gypsum baking on the polymerized prosthesis and helps to obtain a specially true copy.

Example 2

Instead of the methacrylic acid methyl ester used according to example 1, a mixture of 80 parts of methacrylic acid methyl ester and 20 parts of acrylic acid butyl ester is used. 10 parts of benzyl alcohol are added to the liquid mixture

of these two esters and the substance is then mixed with such a quantity of solid polymerized mixture of the said esters as to form a tough paste. This paste is worked up to a prosthesis in the same manner as described in example 1.

Example 3

The following other additions are, for instance, used instead of the before mentioned additions of 20 parts of naphthaline or 10 parts of benzyl alcohol:

| | Parts |
|--------------------|-------|
| Benzol ----- | 33 |
| Anthracene ----- | 2 |
| Benzophenone ----- | 1/2 |
| Toluol ----- | 20 |
| Xylol ----- | 17 |
| Mesitylene ----- | 17 |
| Cumol ----- | 20 |

Example 4

2 parts of liquid paraffine are dissolved in 98 parts of monomeric methacrylic acid methyl ester and this liquid is stirred with 200 parts of solid polymerized methacrylic acid methyl ester, eventually by adding also a small quantity of a catalyst, as benzoyl peroxide. This paste is pressed into a di-part gypsum mold. The two parts of the mold are then pressed together, thereupon polymerisation takes place by placing the mold into boiling water, for half an hour. After cooling and removing from the mold the prosthesis is obtained without defect.

By this way, prostheses are obtained showing neither stains nor discoloring without making necessary a wearisome lining of the gypsum mold with a tin foil.

Instead of methacrylic acid methyl ester also a mixture of 80 parts of methacrylic acid methyl ester and 20 parts of acrylic acid butyl ester can be used in the last mentioned example.

Furthermore, in the last example the solution of 2 parts of paraffine in the monomeric methacrylic acid methyl ester can also be substituted by the following solutions in the monomeric methacrylic acid methyl ester:

| | Parts |
|-----------------------------------------|-------|
| Octane ----- | 10 |
| Ester of aceto-acetic acid ----- | 10 |
| Colophony ----- | 0,5 |
| Turpentine oil ----- | 0,5 |
| Ethyl ester of phenylacetic acid ----- | 2 |
| Benzyl ester of phenylacetic acid ----- | 2 |

These additions to the starting materials of the artificial resins avoid any discoloring and the formation of stains if the castings of artificial resin are produced, for instance, from vinyl or acryl compounds, such as methacrylic acid esters, in the usual manner by heating in gypsum molds. Furthermore, the additions prevent the formation of bubbles, preferably in castings of larger size.

For the production of prostheses, of course, such substances are selected being physiologically harmless for the intended purpose.

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ALIEN PROPERTY CUSTODIAN

PROCESS AND TO SUITABLE APPARATUS
FOR DISINFECTION AND FOR DESTRUCTION OF BACTERIA, RESPECTIVELY

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Application filed June 25, 1940

This invention relates to a process and to suitable apparatus for disinfection and for destruction of bacteria, respectively.

My copending patent application Ser. No. 220,138 has for its object a process of disinfection by means of silver or silver compounds, characterised in that gaseous silver and silver vapour, respectively, or gaseous, and vapourous, silver compounds, respectively, are directly used. The process of manufacturing the gaseous silver, and silver vapour, respectively, or the gaseous, and vapourous silver compounds, respectively, is preferably performed by heating in an air current silver or silver compounds, or heat-resisting porous substances impregnated with silver or silver compounds.

It has now been found that among the compounds of silver the halogens of silver, especially chloride of silver and argentic bromide, display a particularly strong bactericidal effect in a highly humid condition, preferably at a relative air humidity of more than 60 percents.

In order to prepare the vapours of silver halogens, tablets are, for instance, used, which contain chloride of silver, and which in an electric heating cylinder are heated to glowing condition.

Experiments are described below, which have been carried through within a closed chamber of 100 · 60 · 60 centimeters in order to ascertain the bactericidal effect exercised by chloride of silver in the presence of steam upon erysipelas- typhoid fever-, paratyphoid fever-, abortus Bang bacilli, staphylococci, streptococci, pyocyanei, and spores of bacteria anthracis.

The bacilli used were, in the manner already known, caused to cling to small patches of cambric, which were suspended in the closed chamber in such a way that from every direction they were exposed to the vapours of silver chloride.

The various percentages of air humidity were brought about according to Obermiller "Die Einstellung von Luft auf bestimmte Trocknungs- oder Feuchtigkeitsgrade mit Hilfe von Salzen und ähnlichen Stoffen und das 'relative' Trocknungsvermögen" (The adjustment of air to certain drying- or humidity percentages with the aid of salts and similar materials, and the 'relative' drying capacity), (Zeitschr.f.physik.Chemie, Vol. 109, p. 145 of 1924), and were controlled by hygrometers. The slight fluctuations in the course of the tests are due to temperature influences.

After the adequate periods of time the small patches of cambric were taken from the test chamber and put into bouillon. The results were then read, after the patches had been put in the incubator for 48 hours at 37 centigrades.

The results are shown in detail in the subsequent tables.

By the tests it has been established that at a high degree of humidity, preferably at a relative humidity of more than 60%, the bacilli and spores

are destroyed within a comparatively short period and that even anthrax spores are destroyed with certainty, if they have been exposed for eight hours. The other bacteria used in the tests were destroyed either earlier or later, corresponding to the rate of humidity higher than 60%, but under any circumstances, after having been exposed to the vapours of silver chloride for two to six hours. + signifies growth under the above described conditions, — signifies destruction.

Test 1

| | After 1 hour | After 2 hours | After 3 hours | After 4 hours |
|-------------------------|--------------|---------------|---------------|---------------|
| Streptococci..... | + | + | — | — |
| Staphylococci..... | + | + | + | + |
| Erysipelas bacilli..... | + | + | + | + |
| Anthrax spores..... | + | + | + | + |
| Humidity.....per cent. | 42 | 40 | 37 | 37 |

Test 2

| | After 1 hour | After 2 hours | After 3 hours | After 4 hours |
|----------------------------|--------------|---------------|---------------|---------------|
| Streptococci..... | + | + | + | — |
| Staphylococci..... | + | + | + | — |
| Typhoid fever bacilli..... | — | — | — | — |
| Anthrax spores..... | + | + | + | + |
| Humidity.....per cent. | 40 | 40 | 55 | 65 |

Test 3

| | After 3 hours | After 4 hours | After 5 hours | After 6 hours |
|----------------------------|---------------|---------------|---------------|---------------|
| Pyocyanei..... | + | + | + | — |
| Typhoid fever bacilli..... | + | + | — | — |
| Staphylococci..... | + | + | + | + |
| Anthrax spores..... | + | + | + | + |
| Humidity.....per cent. | 45 | 44 | 44 | 50 |

Test 4

| | After 4 hours | After 5 hours | After 6 hours | After 7 hours | After 8 hours |
|----------------------------|---------------|---------------|---------------|---------------|---------------|
| Pyocyanei..... | — | — | — | — | — |
| Typhoid fever bacilli..... | + | + | — | — | — |
| Staphylococci..... | + | + | + | — | — |
| Anthrax spores..... | + | + | + | + | + |
| Humidity.....per cent. | 68 | 70 | 70 | 73 | 73 |

Test 5

| | After 1 hour | After 2 hours | After 3 hours | After 4 hours |
|----------------------------|--------------|---------------|---------------|---------------|
| Streptococci..... | + | + | + | — |
| Staphylococci..... | + | + | + | + |
| Erysipelas bacilli..... | + | + | — | — |
| Anthrax spores..... | + | + | + | + |
| Typhoid fever bacilli..... | + | + | — | — |
| Humidity.....per cent. | 68 | 60 | 58 | 58 |

Test 6

| | After 1 hour | After 2 hours | After 3 hours | After 4 hours |
|-------------------------|--------------|---------------|---------------|---------------|
| Streptococci..... | — | — | — | — |
| Staphylococci..... | — | — | — | — |
| Erysipelas bacilli..... | — | — | — | — |
| Anthrax spores..... | + | — | — | — |
| Humidity..... per cent. | 65 | 75 | 75 | 70 |

Test 7

| | After 1 hour | After 2 hours | After 3 hours | After 4 hours |
|-------------------------|--------------|---------------|---------------|---------------|
| Streptococci..... | + | — | — | — |
| Staphylococci..... | + | — | — | — |
| Erysipelas bacilli..... | — | — | — | — |
| Anthrax spores..... | + | + | ± | — |
| Humidity..... per cent. | 60 | 62 | 65 | 70 |

Test 8

| | After 6 hours | After 7 hours | After 8 hours | After 24 hours |
|--------------------------------|---------------|---------------|---------------|----------------|
| Paratyphoid fever bacilli..... | + | + | — | — |
| Abortus Bang bacilli..... | + | — | — | — |
| Erysipelas bacilli..... | + | + | — | — |
| Staphylococci..... | + | + | + | — |
| Streptococci..... | + | + | — | — |
| Anthrax spores..... | + | + | + | + |
| Humidity..... per cent. | 50 | 49 | 45 | 50 |

Test 9

| | After 2 hours | After 4 hours | After 6 hours | After 8 hours | After 24 hours |
|--------------------------------|---------------|---------------|---------------|---------------|----------------|
| Paratyphoid fever bacilli..... | — | — | — | — | — |
| Abortus Bang bacilli..... | — | — | — | — | — |
| Erysipelas bacilli..... | — | — | — | — | — |
| Staphylococci..... | + | + | — | — | — |
| Streptococci..... | + | — | — | — | — |
| Anthrax spores..... | + | + | + | — | — |
| Humidity..... per cent. | 90 | 86 | 90 | 87 | 100 |

It was established that in the production of halogen vapours, e.g. vapours of silver chloride, for remedial purposes or disinfection a considerable portion of silver chloride is not evaporated due to deposition of metallic silver.

It was, however, found that by an addition of chlorides of alkaline, and/or earthy-alkaline metals (sodium chloride, chloride of magnesium, etc.), preferably in the presence of voluminous, indifferent substances, as silicic acid, titanitic acid, etc. metallic silver is not formed to any considerable extent.

The invention further aims to proceed in such a way that a mixture of the halogen silver compounds and of the alkaline-, or earthy-alkaline chlorides with voluminous substances, as infusorial earth, silica gel, titanitic acid, etc. is compressed so as to form tablets, or that the molten mixture is absorbed by compressed, porous pills.

It was furthermore ascertained that in practising the process it is preferable to proceed, as described below:

If vapours of halogens of silver, e.g. a vapour of silver chloride, are produced in small, electrically heated devices, the liquid silver chloride thus formed is very troublesome, because it is readily inclined to creep, will penetrate, or flow around, the ceramic substances, on which the material used for the electric resistance rests, and thus finally will reach the materials used for the electric resistance, and will destroy them. This penetration, through it cannot be prevented,

can, however, be delayed, if the heating appliances are either lined with a sintered or molten substance, as porcelain or quartz, or are faced with a material tightening the surface by the formation of a layer similar to glass. The flowing-around can, on the contrary, only be prevented by keeping the entire device at a temperature, which makes the formation of liquid silver chloride impossible by immediate transformation of the latter into a vapour, which end can be reached by embedding the plant into a well insulating material. Though it is true that in the tube used for discharge of the vapours liquid silver chloride will again be formed by condensation, this newly formed silver chloride will also be prevented from doing harm by first keeping the pipe at a certain distance, though only a short one, from the internal follow space of the heating device, and furthermore in such a way that the lower end of this pipe projects into the device for such a distance that immediate evaporation will again take place. The same applies to the tablets containing chloride of silver, which tablets will discharge liquid silver chloride liable to display a detrimental effect in the stated manner, were would not the substances be placed in such a way that the halogen of silver will immediately be transformed into the vaporous state; according to experience this will take place in the lowest fourth of fifth part of the heating zone.

In order to prevent under any circumstances detrimental effects as soon as the current is mislead due to molten silver compounds or molten silver, or due to a penetration of the ceramic body by silver or silver compounds, the supporting grid, on which the tablets containing silver chloride are placed, is grounded, wherefore a jumping-over of the current, if any, will not imply any danger.

One of the many possible embodiments of the device is shown in the drawing.

The ceramic body A supports the heating wire H; its interior surface is tightened with a layer similar to glass, produced by fritting. The heating body is perfectly enclosed by an insulating jacket I. Tube C discharging the vapours of halogeneous silver, terminates at D placed in the uppermost fourth part of the heating device. Grid B, which supports the tablets containing silver chloride, is placed in the neighbourhood, of, or within the lowest fourth of the heating zone.

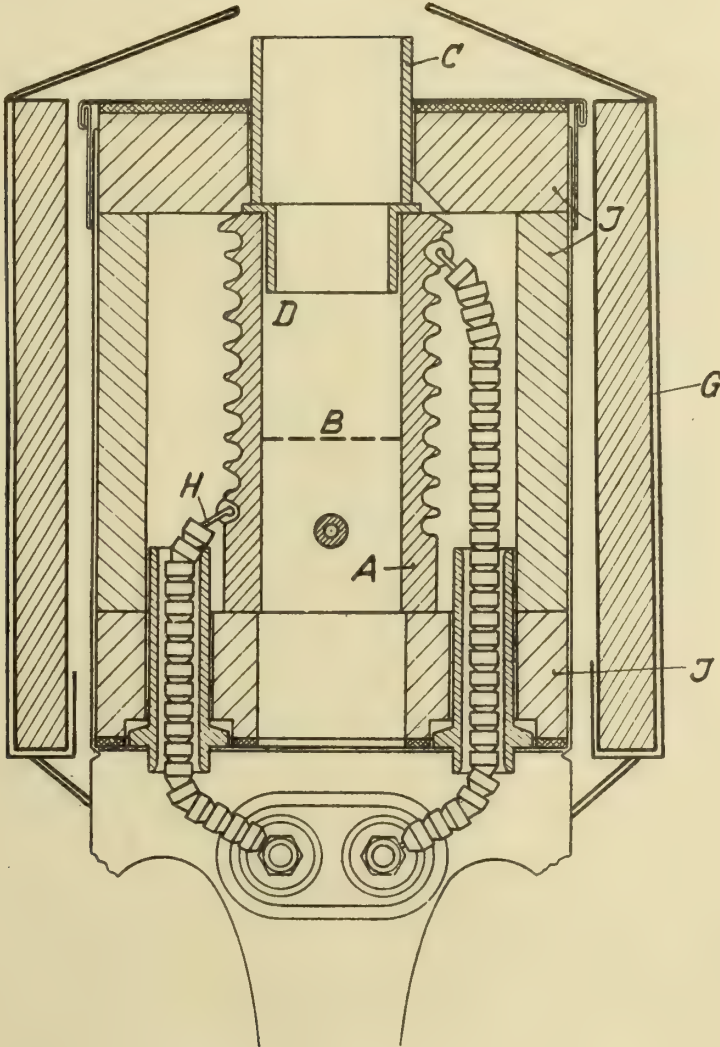
As small quantities of hydrochloric acid might be formed due to chemical transformation of the halogen compounds with silicic acid, or titanitic acid, or the like, in the presence of steam, especially due to overheating, it is preferable not to pass the steam through the heating tube, but to admit it only to the evaporated silver compounds near the upper end of the tube. In doing so, it is preferable to provide a vessel G surrounding the device at a short distance, and filled with porous substances imbued with water; by the radiation heat emanating from the heating device, the water will be evaporated to a considerable extent. The steam is thereupon mixed with the vaporous halogen of silver escaping from the heating tube. By an addition of small quantities of ammonium carbonate to the water it is possible to bring about an alkalization of the steam, if desirable.

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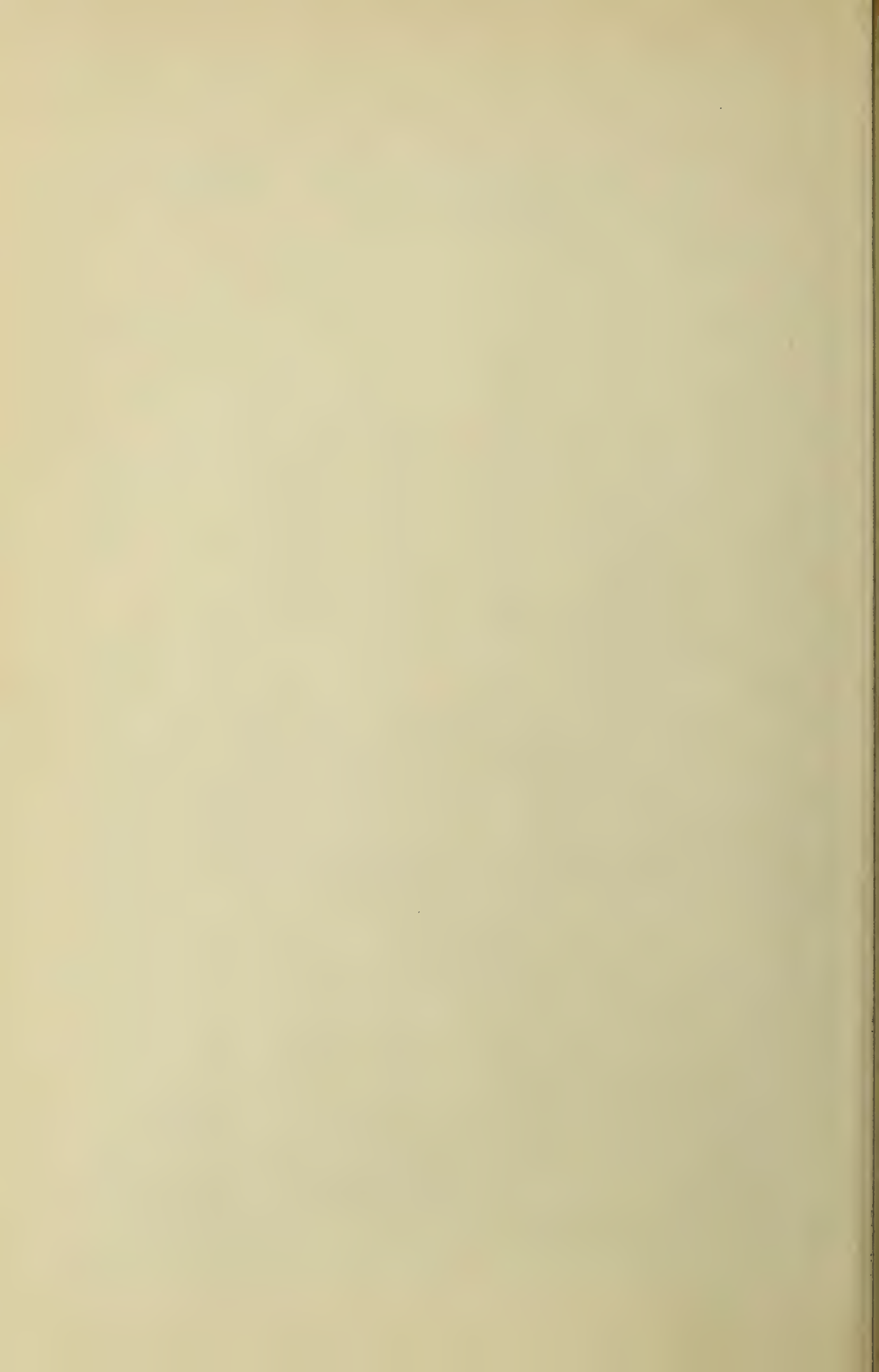
R. MÜLLER
PROCESS AND TO SUITABLE APPARATUS FOR
DISINFECTION AND FOR DESTRUCTION
OF BACTERIA, RESPECTIVELY
Filed June 25, 1940

Serial No.
342,356



Inventor:
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ALIEN PROPERTY CUSTODIAN

PRESSES FOR MAKING WORK-PIECES CONI- CALLY TAPERING IN LONGITUDINAL DIRECTION

Wilhelm Mänken and Otto Uhlmann, Waren,
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Property Custodian

This invention relates to presses and more particularly to so-called extrusion presses serving for the production of work-pieces having a profile conically tapering in longitudinal direction.

It is known to produce work-pieces having a profile conically tapering in longitudinal direction by means of presses of the aforementioned kind including conical mandrils connected with the press-plunger, said mandrils moving during the operation of pressing through a fixed die of uniform cross-section. Although with known processes of this kind there may be produced work-pieces having angular profiles with the parts thereof varying both in thickness as well as in length, it is not possible to make work-pieces of a T, I, U or similar profile of varying length in addition to varying thickness of the web and of the flanges of the profile.

Our present invention has for its general object to devise a press permitting to produce work-pieces having profiles varying to a far greater extent than had been possible to produce with presses of known construction.

According to our invention we propose to use for this purpose a die composed of a plurality of parts which are caused to move apart during operation of the press. Preferably this motion of the parts of the die is effected by action of the operating pressure. Moreover, the interior surfaces of the movable parts of the die may conically enlarge in direction towards the press-plunger, thus facilitating the motion of said parts away from each other by action of the operating pressure. However, said movable parts of the die may also be actuated by means of suitable operating organs.

The movable parts of the die are provided on the outer side thereof with wedge-shaped surfaces which on their part co-operate with wedge-members of suitable conformation. These wedge-members are adapted to move in dependence from the velocity of the pressing motion, that is the speed of the press, for instance by means of spindles.

The actuating organs for said wedge-members may be driven and properly controlled in suitable manner either by the profile of the work-piece during being discharged from the press or also by the press-plunger.

In some cases it will be necessary to further provide in the rear of the movable parts of the aforesaid die an additional fixed die in order to cover up the gap between said movable parts when moving apart during operation of the press,

this covering up taking place to an extent as these parts do not serve for the production of the final profile to be imparted to the work-piece.

In case portions of the profile produced by means of said additional fixed die shall likewise be of a conformation conically tapering in longitudinal direction, it will be necessary to provide a two-part construction also for this fixed die and to mount the two parts of the latter movably with respect to each other.

Preferably the organs serving to impart motion to the movable die parts are constructed in such a manner that one or several pairs of movable die-parts co-operate at their outer ends, that is at the ends away from the hole in the die, with fitting members provided with curve-shaped recesses. These fitting members are mounted within a wheel-rim having an internal gear and may be rotated with said wheel-rim by means of a spindle, the rotation being effected to such an extent that the movable die-parts will slide in said recesses, whereby the hole in the die will be enlarged in conformity with the shape of the curve of said recesses during the operation of the press, with the result that a conically tapering profile is imparted to the work-piece in longitudinal direction thereof.

In the accompanying drawings which form part of this specification we have represented some examples of construction of our new press. In the drawings, Fig. 1 is a section through the dies of a construction producing a work-piece with an I-profile in longitudinal direction, Fig. 2 a view of the die with movable parts, as seen in the direction of pressing, Fig. 3 a section through the dies constructed to produce a work-piece with a T-profile in longitudinal direction, Fig. 4 a view of the movable die, as seen in the direction of pressing, Fig. 5 a plan-view of a further construction of the die, as seen in the direction of pressing, and Fig. 6 a section along line VI—VI— of Fig. 4.

Referring more particularly to the drawings, in Figs. 1 and 2 the receptacle for the material to be worked in the press is designated by the reference numeral 1, while the parts of the die which are movable transversely to the direction of pressing are designated by the numerals 2 and 3. The parts 2 and 3 of the die are of wedge-shaped conformation on their outer surface, as indicated in Fig. 1 at 4 and 5, in order to co-operate with wedges 6 and 7 of a conformation corresponding to that of said outer surfaces of said die-parts. The wedges 6 and 7 may be actuated by means of suitable operating organs, such as for instance

spindles 8, as shown in Fig. 1. Motion of the die-parts 2 and 3 in direction away from each other is facilitated by the fact that their interior surfaces 9 and 10 are of a conformation conically enlarging in direction towards the press-plunger. The spindles 8 actuating the wedges 6 and 7 are preferably driven and controlled by the profile of the work-piece during being discharged from the press or also by the motion of the press-plunger.

The pressure exerted onto the spindles 8 by way of the wedges 6 and 7 may be varied by properly altering the inclination of the wedge-shaped outer surfaces of the die-parts 2 and 3. In order to insure proper working of the press, care should be taken that no excessive pressures are exerted onto the spindles 8. In the rear of the die-parts 2 and 3 there is further provided the aforementioned additional fixed die which covers up the gap between the die-parts for the above stated purpose.

The press shown in Fig. 3 and 4 serving for the production of a work-piece with a T-profile is constructed similarly to the press shown in Figs. 1 and 2. In Figs. 3 and 4 the receptacle for the material to be worked by the press is designated by the reference numeral 1, while 12, 13 and 14 are die-parts mounted movably in transverse direction to the direction of pressing.

The outer surfaces 15 of the parts 12, 13 and

14 are likewise wedge-shaped in order to co-operate with the wedges 16 actuated by the spindles 17. In the rear of the die-parts 12, 13 and 14, there is again used a fixed die 18 covering up the gap between the movable die-parts for the above stated purpose.

In the construction of the press shown in Figs. 5 and 6 the movable die-parts 19 form at their inner ends 20 the hole in the die. By action of the work-piece during being discharged from the press the die-parts 19 will be pressed at their outer ends against fitting members 22 mounted within a wheel-rim 23 with an internal gear. A pinion 24 on a spindle 25 is in mesh with the teeth of said internal gear. The wheel-rim 23 may be rotated by means of the spindle 25 through such an angle that the ends 21 of the die-parts 19 will slide in the curved recesses of the fitting members 22, for which purpose the ends 21 are of a conformation similar to that of the recesses 26. By this the parts 19 will move apart during the operation of the press and the work-piece will be given a profile conical in longitudinal direction. Preferably motion of the die-parts is effected and controlled by the motion of the press or in some other suitable way.

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PRESSES FOR MAKING WORK-PIECES CONICALLY
TAPERING IN LONGITUDINAL DIRECTION
Filed June 25, 1940

Serial No.
342,400

2 Sheets-Sheet 1

Fig. 2

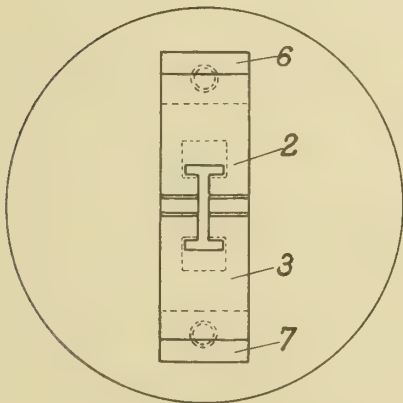


Fig. 1

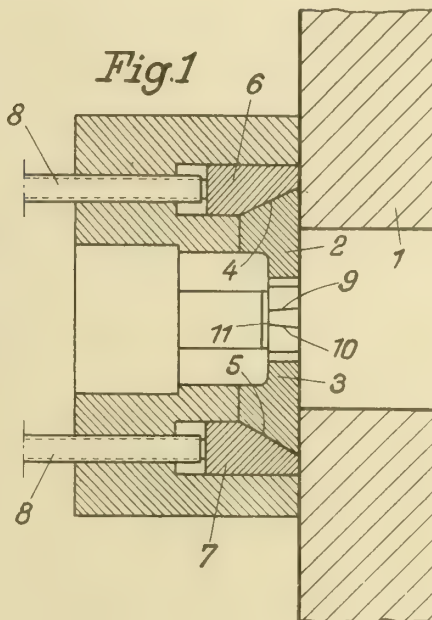


Fig. 4

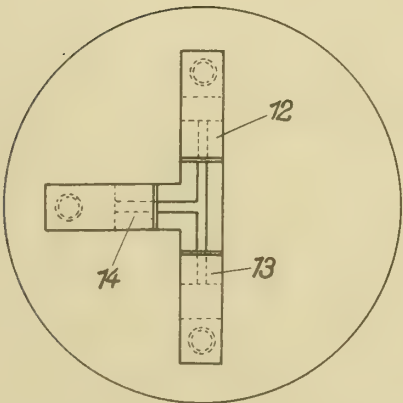
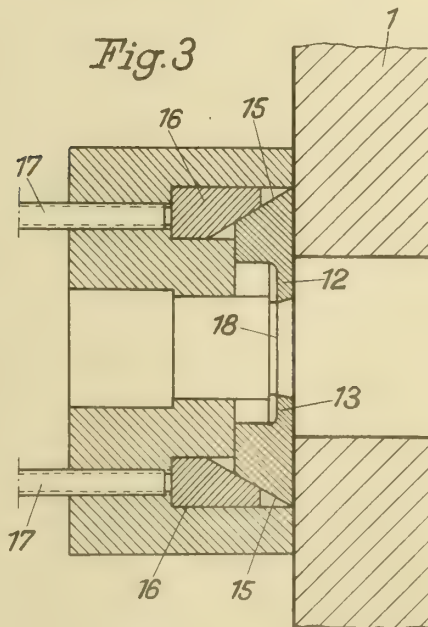
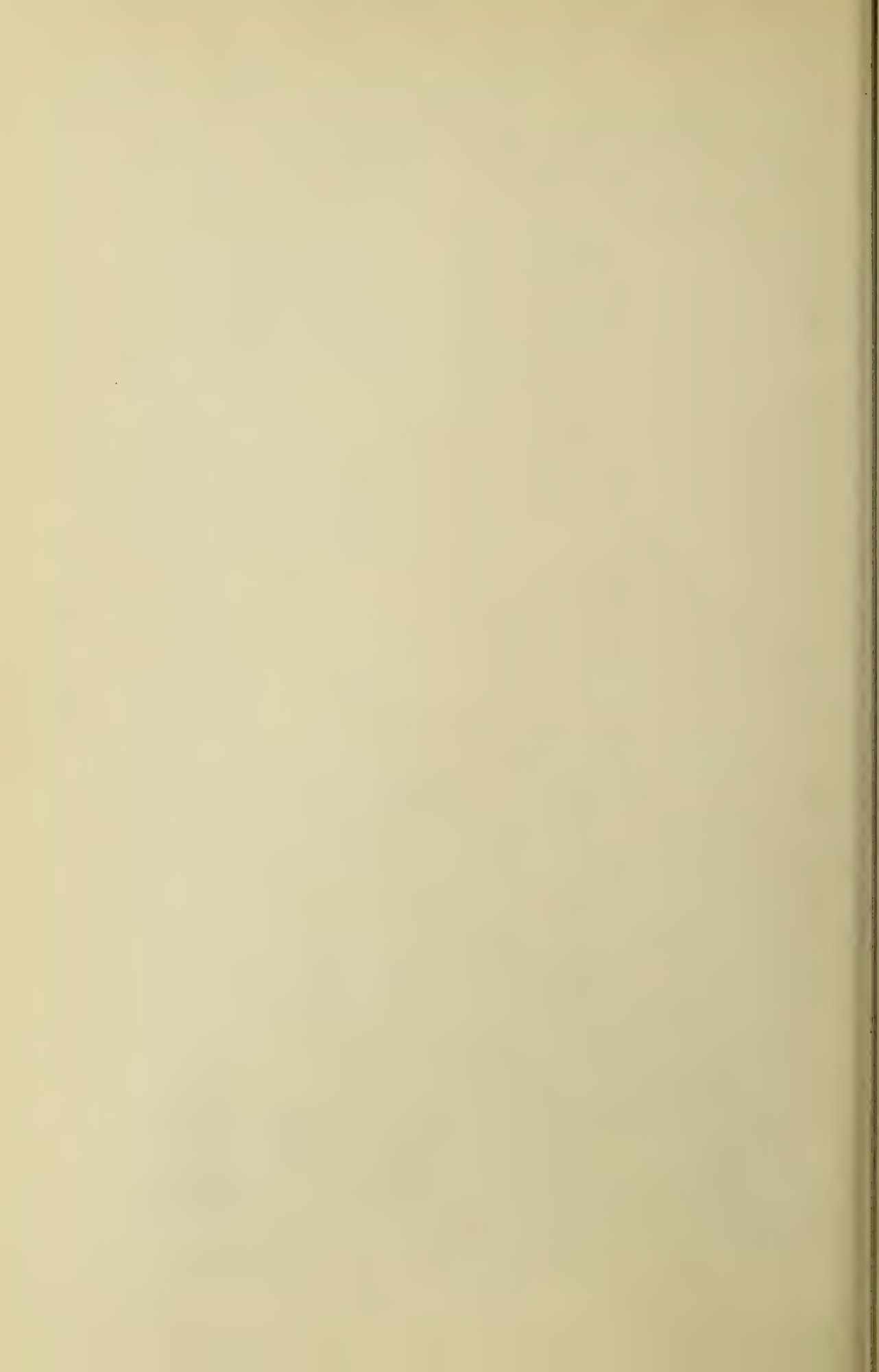


Fig. 3



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342,400
2 Sheets-Sheet 2

Fig. 5

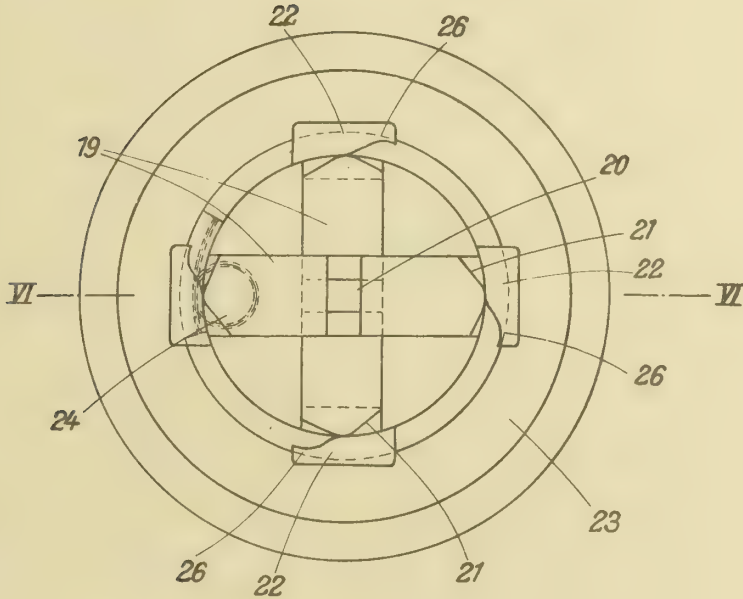
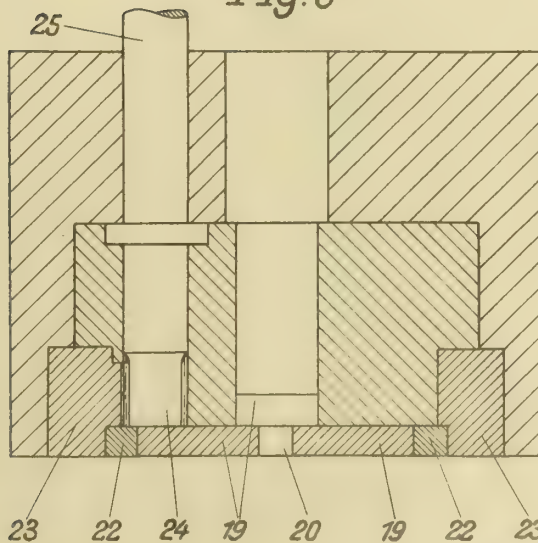


Fig. 5



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ALIEN PROPERTY CUSTODIAN

PRESSES FOR MAKING WORK-PIECES CONI- CALLY TAPERING IN LONGITUDINAL DIRECTION

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vested in the Alien Property Custodian

Application filed June 25, 1940

This invention relates to Presses and more particularly to so-called extrusion presses serving for the production of work-pieces having a profile conically tapering in longitudinal direction.

It is known to produce work-pieces having a profile conically tapering in longitudinal direction by means of presses of the aforementioned kind including conical mandrils that are connected with the press-plunger, said mandrils moving during the operation of pressing through a fixed die of uniform cross-section. Although with known presses of this kind there may be produced work-pieces having angular profiles with the parts thereof varying both in thickness as well as in length, it is not possible to make work-pieces of a T-, I-, U- or similar profile of varying length in addition to varying thickness of the web and of the flanges.

My invention, now, has for its general object to devise a press permitting to produce work-pieces having profiles varying to a far greater extent than had been possible to produce with known presses.

According to my invention I propose to equip the press with a two-part die and to provide guide means for the two halves of said die on the exterior surfaces thereof, said guide means being of the form of a holder or support tapering in the direction of pressing, while the distance between the two halves of the die is defined by the aforesaid conical mandrils that are connected with the press-plunger, said mandrils tapering in direction towards the latter, in order to properly guide the two halves of the die. By this the two halves of the die will gradually approach each other during the operation of pressing and simultaneously move in said holder or support in direction of the operation of pressing in accordance with the approaching of said two halves of the die. In addition to the conically tapering guides for the two halves of the die, the said mandrils are further provided with recesses tapering in direction towards the press-plunger to produce the aforesaid conically tapering profiles. Moreover, these recesses in the mandrils may be tapering towards the press-plunger both in direction of their height as well as in direction of their width.

According to my invention, furthermore, there may be provided bridge-like members guided in front of the two halves of the die and bridging the gap between these in order to subdivide the conically tapering profiles of the work-piece to be made by the press.

In the accompanying drawing I have repre-

sented an example of a press constructed in accordance with my present invention. In the drawing, Fig. 1 is a vertical longitudinal section through my new press in condition shortly after the beginning of the operation of pressing, Fig. 2 a horizontal longitudinal section of the press represented in Fig. 1 without the work-piece, Fig. 3 a view of the press shown in Fig. 1 and 2, as seen in direction opposite to the operation of pressing, Fig. 4 a section along line IV—IV of Fig. 2, Fig. 5 a horizontal longitudinal section of the press shown in Fig. 2 without the work-piece in condition shortly before completion of pressing, Fig. 6 a view of a press constructed in accordance with Fig. 3 for the production of U-shaped work-pieces having a conically tapering profile.

Referring more particularly to the drawing, the receptacle of the press is designated by the reference numeral 1, the press-plunger by the numeral 2, the press-mandrils connected with the press-plunger by the numerals 3 and 4 and the two halves of the die by the numerals 5 and 6. The two halves of the die are exteriorly guided by means of a conical holder or support 7, while the distance between said halves of the die is defined by guide-ribs 8 provided on the mandrils 3 and 4. As may be seen from Fig. 2, the guide surfaces of the ribs 8 for the two halves of the die are conically tapering in direction towards the press-plunger, so that during the operation of pressing the distance between the two halves 5 and 6 of the die will be diminished, which is due to the fact that by action of the operating pressure the two halves of the die will be displaced in direction of pressing in the conical guide surface of the member 7, until they abut against the guide surfaces of the ribs 8. In this manner the thickness of the web of the profile defined by the distance between the two halves of the die will be of progressively and uniformly tapering conformation. The mandrils 3 and 4 are further provided with recesses 9 which are likewise tapering towards the press-plunger in direction of their height as well as in direction of their depth, as indicated in the drawing. In the construction shown in the drawing the two flanges of the I- or the two T-profiles will be defined by said recesses 9. The produced profile may conveniently be subdivided by means of the bridge-like members bridging the gap between the two halves 5 and 6 of the die, as may be seen from Fig. 4, and being guided by recesses in the two halves 5 and 6, with the result that instead of the I-profile there may be obtained two T-profiles.

As a matter of course, my new press may also

be used for the production of profiles other than those mentioned, for instance for the production of U-profiles. A construction of the press modified for this purpose is shown in Fig. 6 in accordance with Fig. 3 for the production of two U-profiles conically tapering in longitudinal direction. In this case 11 and 12 represent the two halves of the die, 13 is the mandril con-

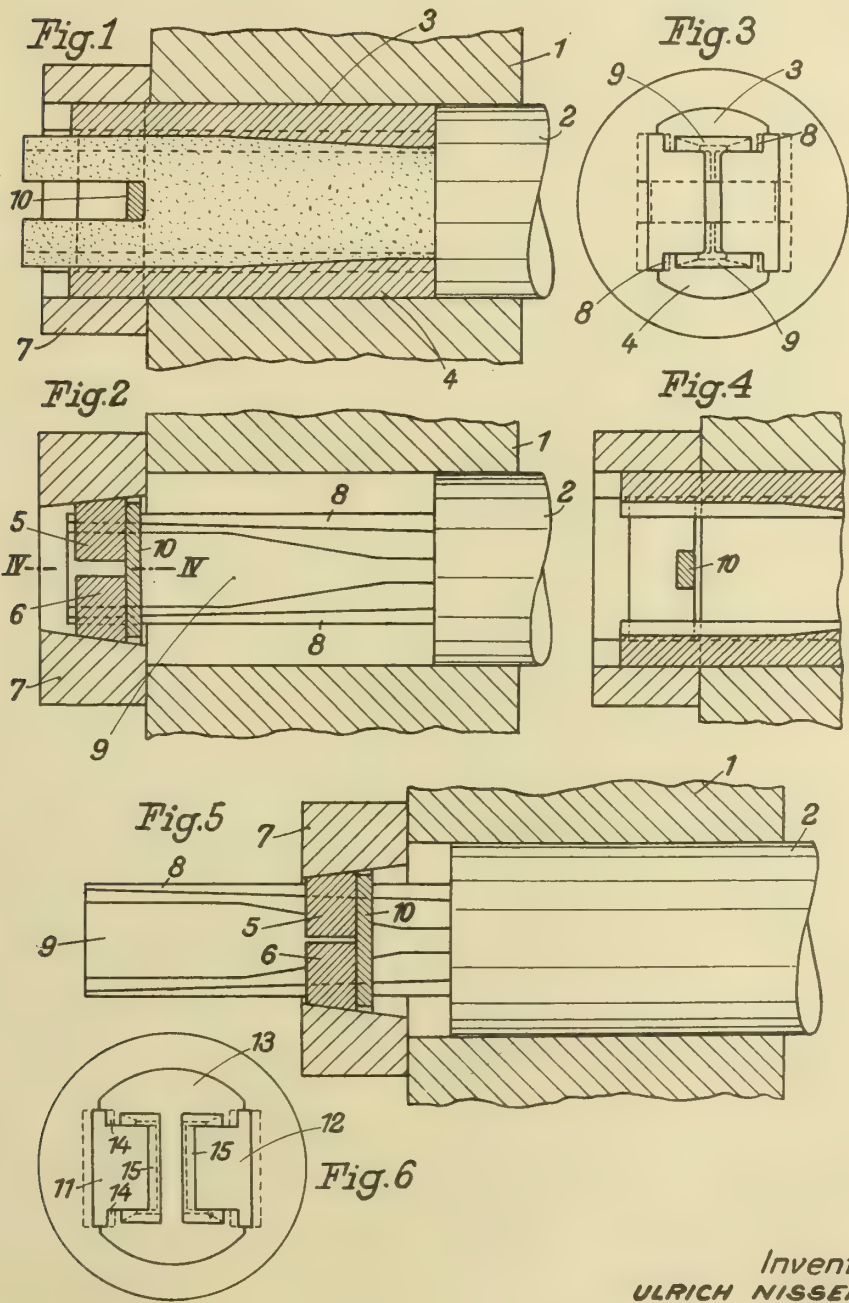
nected with the press-plunger, 14 are the guide-ribs for the two halves of the die and 15 the recesses in the mandril 13, said recesses 15 defining the dimensions of the two arms of the U-profile to be produced, the same as the recesses 9 in the construction shown in Figs. 1 to 5, and in addition the thickness of the webs.

ULRICH NISSEN.

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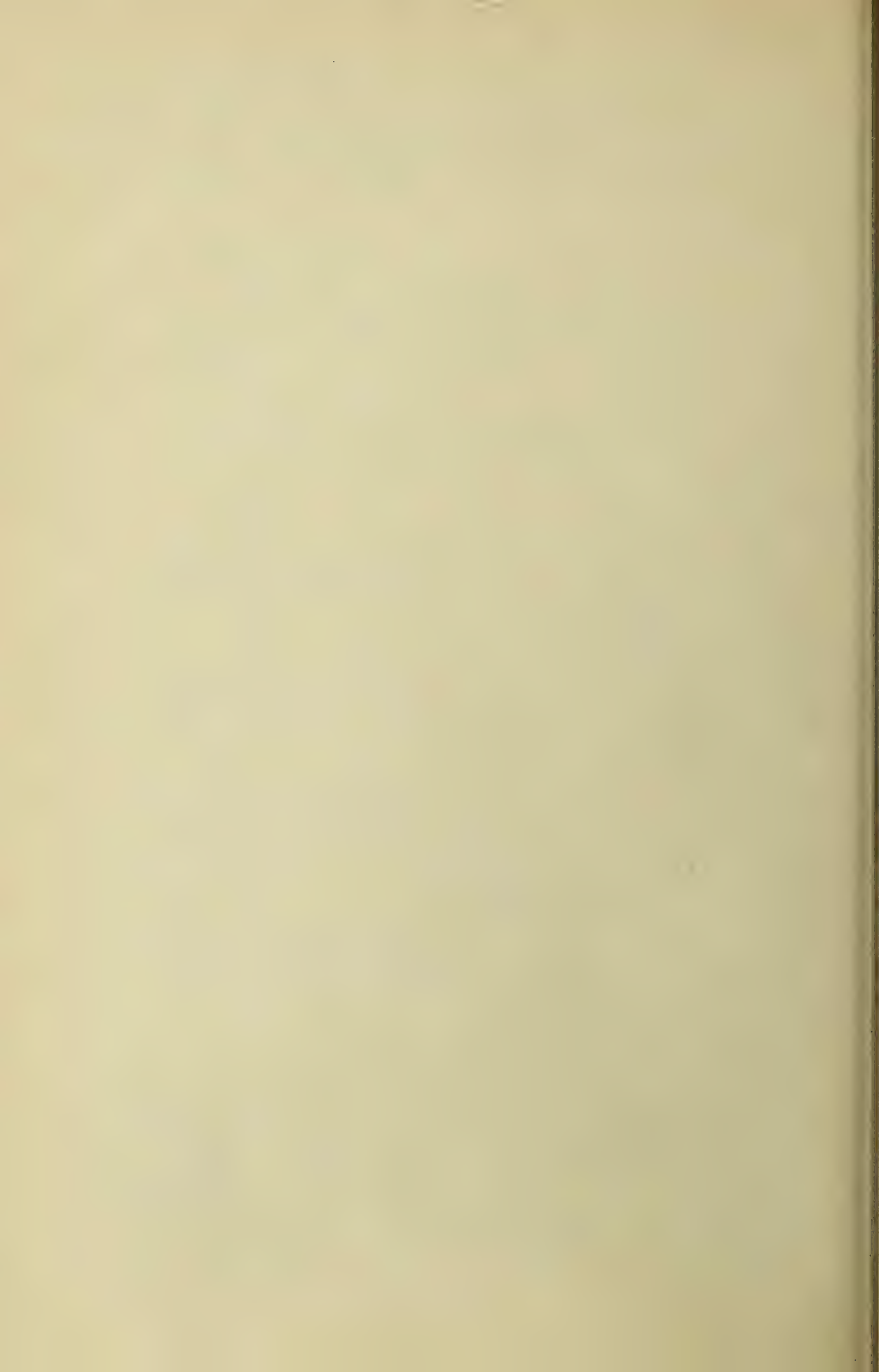
U. NISSEN
PRESSES FOR MAKING WORK-PIECES CONICALLY
TAPERING IN LONGITUDINAL DIRECTION
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ALIEN PROPERTY CUSTODIAN

COPYING MODELS

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Application filed June 28, 1940

The invention relates to a process for producing copying models and copying stencils for copying milling machines for metal-working and copying moulding machines for wood-working and the like.

Hitherto the models for copying milling machines for metal-working and copying machines for wood-working are made out of wood or out of stone-powder, poured out in fluid state over a counter mold from wood. Besides metal casting was employed.

The wooden model as the negative model or as the negative stencil has the defect that the wood is not enough resistant to the caliper of the copying milling machine for metal-working and copying moulding machines for wood-working; thus the caliper can be pressed into the wood whereby the exactness of the copying is injured. The model out of stone-powder has the defect that sharp edges and thinner free standing cross pieces easily are broken out. Besides also the model out of stone-powder is affected being touched by the caliper of the copying milling machine for metal-working and copying moulding machines for wood-working. The model of metal-casting made out of a sand mold is inexact and has a rough surface, also influencing the milling work in an unfavorable manner.

According to the invention it is proposed to employ artificial resin as casting material for the models or stencils for copying milling-works because the disadvantages existing hitherto can be avoided by using artificial resin. Artificial resin is of sufficient solidity and finer details of the copying models can be reproduced exactly by the fusible artificial resin. Pouring off the fusible artificial resin, however, difficulties arise because the artificial resin combines closely with wood and the like. Therefore a pouring off was not possible. These difficulties could not be eliminated by applying the known model-powders with which wooden models are covered in order to prevent the adherence of the sand of the mold.

Now there was found that artificial resin can be employed for the producing of copying models used for the casting from the negative models without the artificial resin adhering to the wood of the negative model, if the model to be formed consisting of wood, plaster of Paris and the like first is covered by a soft to elastic coat easily to be removed as well from the model to be formed as also from the solidified artificial resin. This may be done, for instance, by covering the model to be formed with a coat of wax which is spread with metallic dust and a further coat of heat-

resistant lacquer combining neither with the metallic layer nor with the artificial resin. After that the model is fixed in a known manner in a casting box which then is filled up by pouring in the molten artificial resin free from air bubbles.

Especially suitable as artificial resin are melt-able polymerized vinyl compounds as polymerized vinyl esters, polymerized styrenes and the like, especially suitable are, for instance, polymerized vinyl acetates, particularly a mixture of a low and a middle grade of polymerization.

Besides there was found that it is especially advantageous to produce the coat uniformly of caoutchouc respectively of a caoutchouc lacquer.

Hereby it is only necessary to cover the wooden model with the caoutchouc lacquer, resp. with the solution of caoutchouc whereupon the casting by the artificial resin can be executed. Hereby the process is essentially simplified. The model of artificial resin can always easily be removed from the negative model out of wood or the like.

Active solutions of caoutchouc according to the invention are above all the commercial products of this marking, that is solutions of some per cents of caoutchouc in suitable solvents, as f. i. benzene, benzine, trichlorethylene and so on. Likewise successfully also corresponding solutions of artificial polymerisates or mixed polymerisates, as, f. i. the butadiene polymerisates known by the trade mark "Buna" and mixed polymerisates of butadiene with acrylic acid nitril or other acrylic acid derivatives like acrylic acid esters, polymerized styrenes and so on, further the polymerized isobutylenes known by the trade mark "Opanol" may be employed. The film forming solution must act repellently upon the artificial resin used for the casting. Therefore every solution complying with this condition can be employed. Correspondingly according to the invention all the solutions containing additions selected from the group consisting of softening agents, diluents, filling materials, colors, pigments and the like answering this requirement are to be understood as caoutchouc lacquers. It is decisive for the selection of such additions that they at least do not diminish the repelling effect upon the artificial resin. Employing f. i. polymerized vinyl acetate as casting resin above all ligroin or paraffin oils will be applied as dissolved diluents or as diluents emulsified in the solution, talcum and the like will be used as filling material.

There is a further advantage if employing the caoutchouc lacquer, resp. the solution of caoutchouc consisting in the possibility of using colored artificial resin because there is no danger

that the color disappears under the influence of the material of the original. So it is necessary that molds out of plaster of Paris employed, f. i., for the producing of substitute parts for artificial teeth and the like are covered by a foil consisting of tin before the artificial resp. the artificial material can be poured in. Such a work is very troublesome. Employing caoutchouc lacquers, resp. solutions of caoutchouc the covering with a foil of metal is omitted. The caoutchouc lacquer can not only be employed as an active coat of sep-

aration between the fusible artificial resin resp. the artificial material and the material of the model but it also isolates the mold in such a way that the color of the artificial resin is not injured and that the products of artificial resin do not lose their color. Thus the original color of the artificial material is kept.

HERMANN EHRENBURG.
HANNS FICKERT.
HERMANN UNTERGUGGENBERGER.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

H. FICKERT ET AL
COPYING MODELS
Filed June 28, 1940

Serial No.
342,900

Fig. 1.

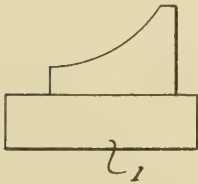


Fig. 2.

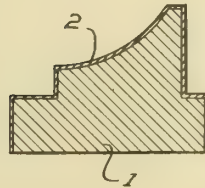


Fig. 3.

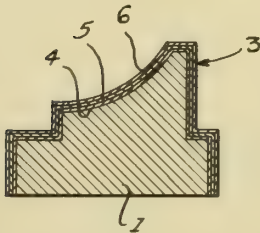


Fig. 4.

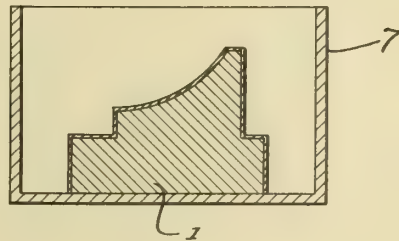
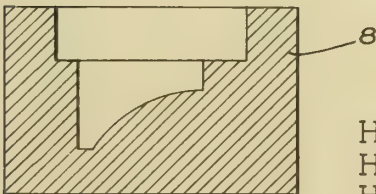


Fig. 5.

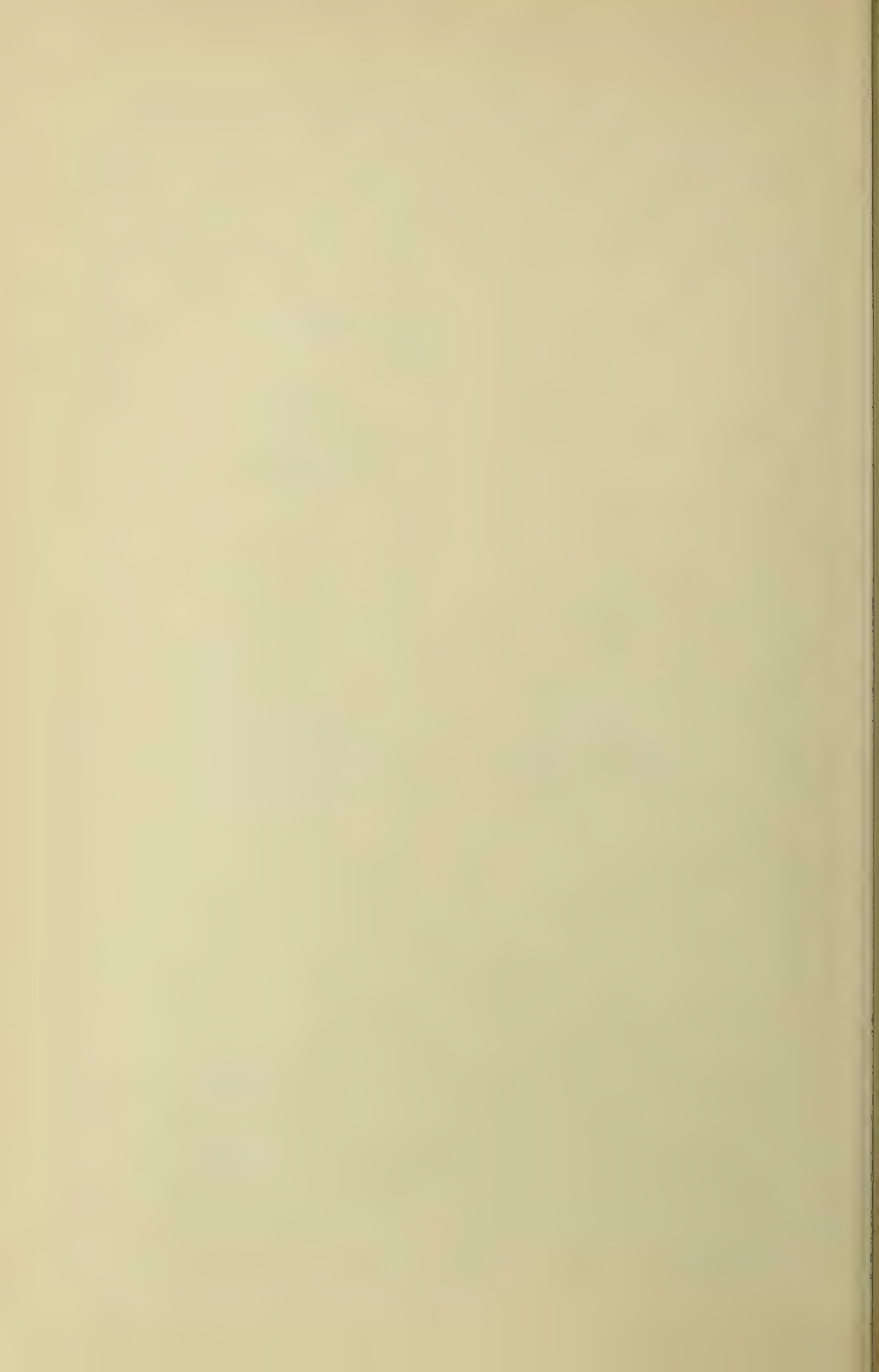


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ALIEN PROPERTY CUSTODIAN

MANUFACTURE OF HOSIERY

Friedrich Oswald Donner, Chemnitz, Germany;
vested in the Alien Property Custodian

Application filed June 28, 1940

This invention relates to an improvement in the manufacture of hosiery and is particularly directed to a new type of stocking provided with novel and simple means to prevent the stocking from getting damaged when pulled onto the foot and leg of the wearer.

It is a well known fact that hosiery consisting of thin threads of real silk or artificial silk will easily get torn when pulled onto the foot and leg, because those places of the sock or stocking to which the pulling force of the fingers is applied are neither strong enough to resist that pull of the fingers, nor capable of transmitting the pulling force in properly distributed fashion to the adjacent parts of the sock or stocking.

In order to overcome this rather serious drawback it has already been proposed to provide the sock and stocking along the seam on the back of the article with a tube-like strip of fabric and a cord loosely passing through that latter strip of fabric. The idea being that pulling the stocking along that cord onto the foot and leg of the wearer would be a safe and easy way to prevent the stocking from getting damaged. However, in practical use this kind of an arrangement is rather unsatisfactory, as thinly looped hosiery of real silk or artificial silk when pulled along cords will quickly wear out.

According to the present invention I solve the problem in a very much simpler and more satisfactory way. I provide the leg-portion of the stocking with one or a plurality of longitudinal strips of fabric. These strips I arrange on the outside of the stocking in such a way that they will serve as a means by which the stocking may be seized and pulled onto the leg, whereby the pulling force of the fingers is passed on to the various portions of the stocking in a properly distributed fashion. These strips may be attached to the stocking in various ways. One or a plurality of them may be fastened in the longitudinal seam on the back of the stocking, while additional strips may be arranged on the sides of the stocking or along the symmetry line on the front part of the stocking.

In order to make my invention more readily understood I will now proceed to describe it with the aid of the accompanying drawings which form a part of this specification and in which the same reference numerals indicate the same or corresponding parts. However, it is to be understood that changes, variations and modifications which come within the scope of the claims hereunto appended can be resorted to.

In the drawings:

Figs. 1 to 3 are perspective views of the stocking, showing how the strips are arranged on the sides of the stocking and along the symmetry line on the back of the stocking;

Fig. 4 is a cross section on line 4—4 of Fig. 3;

Fig. 5 is a fractional perspective view of the stocking, showing how the strips may be formed integral with the stocking by providing the stocking with longitudinal folds.

In the drawings 1 is the stocking, while 3 is the seam holding the edges of the stocking together and forming the symmetry line on the back of the stocking. Fastened along the symmetry line is a strip of fabric 2 with one of its longitudinal edges by means of an elastic seam. This strip may be of any suitable kind, but should preferably possess the same elasticity and extensibility as the leg of the stocking. The strip may be produced either through knitting, weaving or braiding with or without the addition of rubber threads. It may be of any shape and formation. It may be smooth or fashioned like lace work; it may be provided with holes or with projections and recesses at the edge; it may be of substantial width or narrow like a cord; it may even consist of only a crocheted or plaited string or a fringe. It is also possible to form the strips from the stocking itself by providing the stocking with longitudinal folds as indicated at 4 of Fig. 5.

In stockings and socks provided with a longitudinal seam 3, one of the longitudinal edges of the strip 2 is fastened in that longitudinal seam (see Fig. 1). Additional strips may be arranged on the sides of the stocking or along the symmetry line on the forward portion of the stocking, either by sewing or with the aid of adhesive material, or in any other suitable way (see Figs. 2, 3, 4). But, care should be taken that the strips do not reach down to that portion of the stocking which, when the stocking is being worn, is covered up by the shoe of the wearer, to prevent the creation of unpleasant areas of pressure. In the examples illustrated in the drawings the lower ends of the strips terminate either in or beside the reinforced portion 5. But, of course, it is also possible to let them reach down a little lower, or, to have them terminate somewhat higher up. And, naturally, the same applies to the upper ends of the strips, which either may start in the reinforced portion 6, or lower down as illustrated in the drawings. It is further possible to subdivide the strips into a number of separate portions with a corresponding number of intervals between the individual

portions, as illustrated in Fig. 3. Important is only that the strips are of such formation that they afford a reliable hold to the hands of the wearer, and, that with their aid the stocking can conveniently be pulled onto the foot and the leg without making it necessary for the wearer to touch the looped fabric of the stocking proper which, if directly touched by the fingers, might not be strong enough to resist the pull and get torn. That is why the strips should be so ar-

ranged that their free edge, i. e. the one which is not fastened to the stocking, can be lifted from the looped fabric.

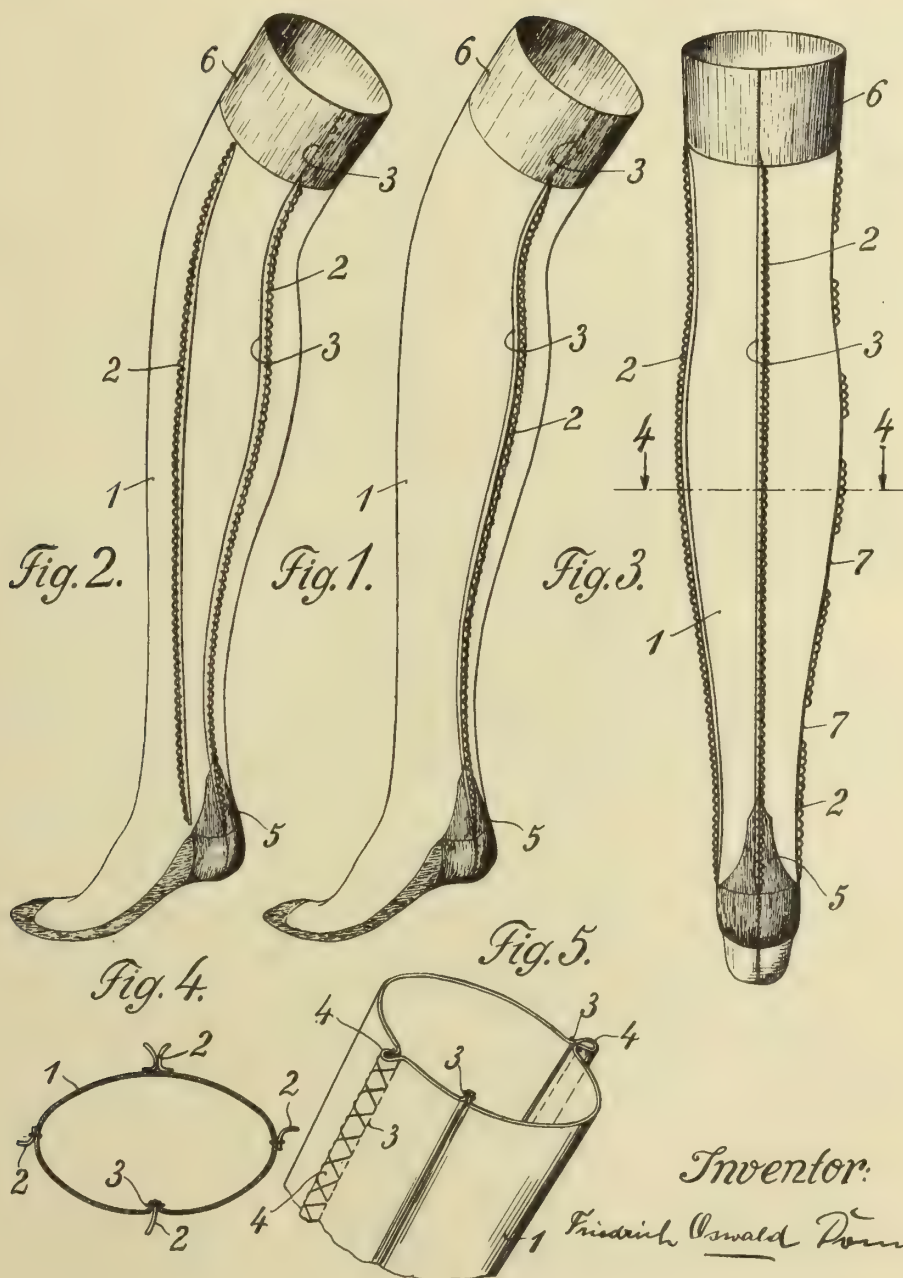
My invention can be applied to any of the ordinary type of stocking. It may be of the regular form as produced on the flat hosiery frame and on the circular knitting machine, or cut from warp fabric and produced of one thread or a plurality of threads of any desired thickness.

FRIEDRICH OSWALD DONNER.

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BY A. P. C.

F. O. DONNER
MANUFACTURE OF HOSIERY
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ALIEN PROPERTY CUSTODIAN

METHOD OF MANUFACTURING SYNTHETIC FIBRES FROM POLYVINYL ALCOHOL

Ichiro Sakurada, Shoki Lee and Hiroshi Kawakami, Kyoto, Japan; vested in the Alien Property Custodian

No Drawing. Application filed June 29, 1940

This invention relates to a method of manufacturing synthetic fibres from polyvinyl alcohol group, the features of the method being (1) to dissolve polyvinyl alcohol in water or in an aqueous alkali solution, (2) to spin the resulting solution by an ordinary wet spinning method in a coagulating bath of which the predominating part is water and (3) to subject the resulting fibres to hardening processes.

The object of the invention is to provide a new method of manufacturing synthetic fibres of good strength and elasticity wherein inexpensive solvent and coagulating bath are used and wet spinning apparatus is employed.

It is known that polyvinyl alcohol is soluble in water or in an aqueous alkali solution and therefore spinning synthetic fibres therefrom may be feasible. But the fibres thus produced is water soluble too. On account of this, any wet spinning method that necessitates the use of coagulating bath principally water, has generally been believed inapplicable. Thus the patents such as British Patent 386161, French Patent 732895, British Patent 393488, and British Patent 393505 all refer a dry spinning method only.

The inventors of this invention have been studying wet spinning methods in which a coagulating bath principally water is to be used, and as a result have discovered that a certain per cent (5% or more) water solution of neutral salts such as sodium chloride, sodium sulphate (Glauber's salt) and/or ammonium sulphate is sufficiently coagulative and discovered also that by adopting such solution for a coagulating medium, a wet spinning method is workable in manufacturing synthetic fibres from polyvinyl alcohol water solution.

Of course the fibres obtained in this manner is soluble in non-salt-containing water which means the fibres as it is, can not be used successfully for ordinary spinning purpose. In this invention, therefore, this water soluble polyvinyl alcohol fibres, in its wet state or half dried state or dried up state, is subjected in or not in the presence of acid or alkali to hardening processes in from one to several steps by using a water solution of formaldehyde with sodium chloride, sodium sulphate (Glauber's salt) and/or ammonium sulphate.

By washing with water and then drying up the resulting product, there will be obtained strong elastic synthetic fibres which is water insoluble too.

To the original viscous liquid to be spun may be added one or more of the following materials: vegetable or animal oil, mineral oil, or other suitable hydrophobic materials, and any early condensation product of urea, thiourea or carbolic acid with formaldehyde. This is for giving more water-repelling property to the fibres and fur-

thermore in order to regulate viscosity or coagulation of this original liquid one or more of the following materials may effectively be added in an amount not sufficient enough to cause any precipitation of polyvinyl alcohol: any water miscible organic liquid such as methyl alcohol, ethyl alcohol, acetone, etc., any dilute acid of such as sulphuric acid, hydrochloric acid, acetic acid, etc., and any of water soluble, alkali metal-, alkali earth metal-, or metal-salts. Likewise if formaldehyde or other suitable aldehyde be added to the coagulating bath, it will facilitate the spinning operations. The more complete understanding of the invention will be had by the following examples.

Example I

One part of ordinary dry and pure polyvinyl alcohol is added to eight parts of water and dissolved thereof by heating to obtain an original viscous liquor. The solution thus obtained is extruded through ordinary wet spinning nozzles and spun in a coagulating bath which is a water solution having substantially the following ingredients per litre:

| | Grams |
|----------------------------------------|-------|
| Sodium sulphate (Glauber's salt) | 388 |
| Sulphuric acid..... | 110 |

The polyvinyl alcohol fibres thus spun in a water solution of the above composition is kept well soaked in a bath for hardening for four hours and then heated at 80° Centigrade for one hour, the composition of the said hardening bath being as follows:

| | Per cent |
|----------------------------------------|----------|
| Sulphuric acid..... | 10 |
| Sodium sulphate (Glauber's salt) | 23 |
| Zinc sulphate..... | 3 |
| Formaldehyde | 3.5 |
| Water | 60.5 |

The resulting fibres thus hardened is washed with water and dried up by any ordinary method. Then there will be obtained beautiful synthetic fibres of glossy white colour, the strength of which being 2.5 grams per denier and the elongation 25.0%.

Example II

One litre of 17% polyvinyl acetate methyl alcohol solution is saponified with 7.9% caustic soda methyl alcohol solution (7.9% of the solution is caustic soda, and the methyl alcohol used thereby is 85% pure, including 15% of water). The resulting precipitant of polyvinyl alcohol is separated from the liquid and squeezed until the polyvinyl alcohol content in the precipitant reaches 50%. Two parts of such product is dissolved by heating seven parts of 2% alkali water solution. The result is a viscous liquid ready for spinning which is then extruded through ordinary wet spinning nozzles and spun in a coagulating bath which

is a water solution having substantially the following ingredients per litre:

| | Grams |
|----------------------------------------|-------|
| Sodium sulphate (Glauber's salt) ----- | 350 |
| Sulphuric acid ----- | 110 |
| Formaldehyde ----- | 10 |

The polyvinyl alcohol fibres thus spun in the above coagulating bath is then subjected to the following three step hardening processes:

First step, to be kept soaked at room temperature for four hours in a bath substantially of following composition:

| | Per cent |
|----------------------------------------|----------|
| Sulphuric acid ----- | 10 |
| Sodium sulphate (Glauber's salt) ----- | 23 |
| Zinc sulphate ----- | 3 |
| Formaldehyde ----- | 3.5 |
| Water ----- | 60.5 |

Second step, to be kept soaked at 65° Centigrade for five hours in a bath substantially of following composition:

| | Per cent |
|----------------------------------------|----------|
| Sulphuric acid ----- | 20 |
| Sodium sulphate (Glauber's salt) ----- | 20 |
| Zinc sulphate ----- | 3 |
| Formaldehyde ----- | 3.5 |
| Water ----- | 53.5 |

Third step, to be kept soaked at 70° Centigrade for three hours in a bath substantially of following composition:

| | Per cent |
|----------------------|----------|
| Sulphuric acid ----- | 5 |
| Formaldehyde ----- | 16.5 |
| Water ----- | 78.5 |

The resulting fibres thus hardened is washed with water and dried up by any ordinary method. Then there will be obtained beautiful syn-

thetic fibres of glossy white colour, the strength of which being 3.8 grams per denier and the elongation 19.0%.

Example III

One part of ordinary dry and pure polyvinyl alcohol is dissolved by heating in eight parts of water, following which is added and admixed 0.05 part of such product as produced by 24 hours' condensation at 18° Centigrade of 50% urea water solution and 36% formaline, together with an addition of ammonium in a small quantity, intimately mixed in a proportion that the resulting mixture shall have a molecular ratio of one mol of urea to 1.3 mol of formaldehyde. Thus an original viscous liquid is obtained which is then extruded and spun through any known wet spinning nozzles in a coagulating bath same as specified in Example I.

The fibres thus spun is kept soaked in a bath for hardening for two hours and then heated at 70° Centigrade for another two hours, the said bath having substantially the following composition:

| | Per cent |
|----------------------------------------|----------|
| Sulphuric acid ----- | 20 |
| Sodium sulphate (Glauber's salt) ----- | 20 |
| Zinc sulphate ----- | 3 |
| Formaldehyde ----- | 3.5 |
| Water ----- | 53.5 |

The fibres thus hardened is washed with water and dried up in an ordinary manner. Then there will be obtained beautiful synthetic fibres of glossy white colour, the strength of which being 3.2 grams per denier and the elongation 20.0%.

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ALIEN PROPERTY CUSTODIAN

FIRELESS LOCOMOTIVE WITH HIGH ACCUMULATOR PRESSURE

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Property Custodian

Application filed July 6, 1940

The invention relates to fireless locomotives with high accumulator pressure, in which between the accumulating container, and as a rule behind a throttling device and the steam cylinders, an equalization container is mounted, and particularly has for its object the arrangement of the equalization container between the superheater and the steam cylinders in such a manner that the losses of heat of the equalization container are low and that at any time so much heat can be supplied from the accumulating container to the equalization container that the service steam in the equalization container cannot condense.

This is attained according to the invention in that the equalization container is arranged inside the insulation and sheathing of the accumulating container, or that this insulation or sheathing is constructed so that it encloses at the same time the accumulating container and the equalization container. The equalization container may be arranged in or outside the accumulating container itself.

By this arrangement is attained, that the walls of the equalization container are heated at any time, especially, however, after a longer standstill of the locomotive, to approximately the temperature of the accumulating container and that for this reason the low pressure steam contained in the equalization container cannot condense, so that water-hammers in the cylinders are securely avoided and besides a close construction of the locomotive is attained.

Several examples for the arrangement of the equalization container according to the invention are illustrated in the accompanying drawing by way of example.

Fig. 1 shows the equalization container arranged above the accumulating container,

Fig. 2 shows the equalization container on the front side of the accumulating container,

Fig. 3 shows the equalization container arranged inside the accumulating container.

Fig. 1 shows a form of construction of the invention in which the equalization container is carried out as a tube of comparatively short diameter and of approximately the same length as the accumulating container, said tube being arranged above the accumulating container and parallel to the same. The accumulating con-

tainer is designated by 1, the equalization container arranged above the accumulating container is designated by 2, the common heat insulation is designated by 3 and the sheathing by 4. The equalization container may be arranged with the same advantageous result below or obliquely below the accumulating container.

Fig. 2 shows another arrangement or construction of the equalization container according to the invention. 1 is the accumulating container from which the steam can be taken and conducted through the throttle element 5 and the superheater 6 to the equalization container 2. This equalization container 2 is constructed as a ring-shaped tube to utilize the space between the sheathing 4 and the accumulating container 1. With the same effect the equalization container may be constructed as part of a ring or as a tube arc.

The equalization container is preferably mounted according to the invention at that end of the locomotive on which the steam cylinders or the cab are mounted.

Fig. 3 shows a form of construction in which the equalization container 2 as continuation of the superheating surface 3 is arranged inside the accumulating container 1. This arrangement is especially simple, but presents the inconvenience that the water content of the accumulating container is reduced owing to the water displacement by the equalization container, so that the capacity of the accumulator locomotive is reduced. This capacity loss becomes greater with rising accumulating pressure, so that the arrangement of the equalization container in the accumulating container is much better at lower accumulating pressures than when these accumulating pressures are high.

The equalization container can be arranged in the accumulating container so that the whole superheater or a portion of the same is carried out with considerably enlarged throughflow cross-section, in which case the large superheater volume acts as equalization container. In order to obtain an effective equalization, the equalization volume, that is in the present instance the superheater volume, must be at least equal to double the stroke volume of the steam cylinders.

PAUL GILLI.



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BY A. P. C.

P. GILLI
FIRELESS LOCOMOTIVE WITH HIGH
ACCUMULATOR PRESSURE
Filed July 6, 1940

Serial No.
344,286

Fig. 1

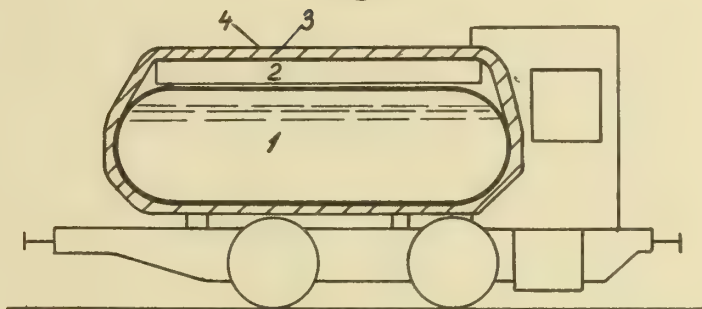


Fig. 2

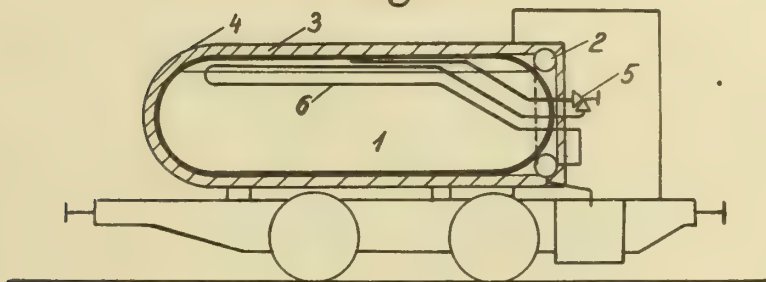
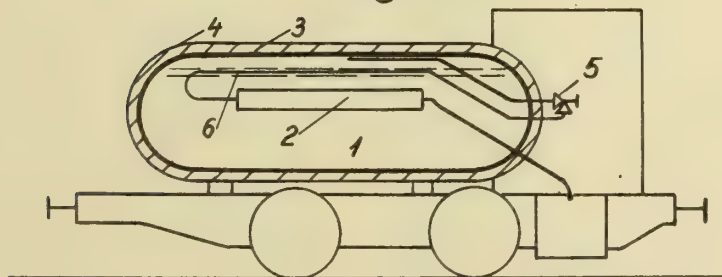


Fig. 3



Paul Gilli
By David M. Marble
his Attorney

ALIEN PROPERTY CUSTODIAN

COMBINED CARPET SWEEPER AND DUST EXHAUSTOR

Friedrich Eisenlohr, Stuttgart-Bad Cannstatt, Germany; vested in the Alien Property Custodian

Application filed July 8, 1940

This invention relates to a carpet sweeping machine combined with a dust collector provided with brushes driven by the rolls supporting the machine. The object of the invention is to increase the capacity of a machine of this type to draw the dust.

One of the characteristic features of the invention is that a gearing inserted between the running rolls and the brush roller is so designed that this roller rotates always in the same direction irrespective of the direction of motion of the machine, the dust being at any rate thrown into a suction slot extending parallel to the axis of the brush.

Another characteristic feature of the invention is that the driving members for the running rolls comprise also two free-wheel gearings, with the aid of which the brush roller is always rotated in the same direction, the one of said gearings driving the brush roller directly, the other driving it by the intermediary of change-wheels, the two free-wheel gearings being actuated alternately according to the change of the direction of motion of the carpet sweeping machine.

It is suited to the object in view to design the rim of the rear wall of the casing enclosing the brush roller, which rim forms together with a part of the nozzle bottom the suction slot as a sort of cutting edge and to arrange the slot-forming members in close proximity to the brush roller.

Still another feature of the invention is that the gap between said edge-shaped rim and the brush roller can be adjusted by means of an adjusting device capable to be locked by a lever operable by a foot of the person using the machine.

The invention is illustrated diagrammatically and by way of example on the accompanying drawings on which Figure 1 is a vertical longitudinal section through a combined carpet sweeper and dust exhaustor designed according to this invention, the left-hand end of the Figure being broken off for want of space. Figure 1a is a separate view of said lacking left-hand end of Fig. 1, and Figure 2 shows in its middle portion a plan of the machine, and the portions above and below said middle portion show horizontal sections thereof.

On the drawing 1 denotes a flat casing closed at its bottom by a plate 2. At the rear end of this plate is a bearing 3 holding a turnable frame 5 provided with two running rolls 4. There are, furthermore, at said bottom plate lugs 6 and 7, of which the first serves as a bearing for a two-

armed lever 8 provided at one of its arms with a running roll 9, whereas the other arm is provided with a slot 10 engaged by a pivot of an excentric disk (not shown) which can be locked in its angular position by means of a pawl-and-ratchet mechanism 12 operable by a push-button 11.

The two-armed lever 8 is affixed to a shaft 13 extending through the bearing 6 and carrying on its extreme end a flat arm 14 provided at its free end with a bearing for a running roll 15.

Within the casing 1 are two walls 16 forming between them a suction channel 17. The front portion of this channel is horizontally enlarged and is narrowed at its lowermost portion by means of a vertical wall 18 extending downwardly from the top of the casing and an extension 19 of this wall so as to form a narrow suction slot 20. Counter thereto the suction channel 17 has a circular aperture 21, by the intermediary of which this channel communicates with the suction device 22 indicated in Fig. 1 by dotted lines. The suction device 22 is situated in a cavity of appropriate size and shape provided in the upper wall of the casing 1, and laterally from said aperture 21 are members 23 (Fig. 2) for connecting the casing of the suction device 2 is provided with a motor shaft 24, one end of which extends outwards from the machine; this end serves as an intermediate driving member when a floor-polishing implement is to be driven by the machine. In order to prevent said end from constituting a hindrance when the sucking device is inserted into the machine, the casing 1, or the cover 2 respectively, is provided with a suitable arranged cavity 25 (Fig. 1).

The wall 18 forms an oblong chamber 26 extending parallel to the suction slot 20 and enclosing the brush roller 27. The ends of the shaft 28 of the brush roller are supported in bearing pieces 29 (Fig. 2) which are vertically guided in the walls 16 of the casing 1 and are pressed by springs 30 in the direction to the broad nozzle supporting bottom 31 (Fig. 1) lying in the range of the brush roller 27. To both ends of the shaft 28, in the space between the casing and the walls 16 are driving wheels 32 and 33 attached which are combined with free-wheels 34 and 35 so designed that both serve to turn the brush roller 27 in the direction indicated by the arrow I in Fig. 1. The driving wheel 33 is designed as a chain-wheel 37 secured to the roll 9. The driving wheel 32 is cog-wheel and meshes with an intermediate wheel 38 rotatory supported in the wall 16 and combined

with a chain-wheel 39 driven by a chain-wheel 40 firmly affixed to the roll 15.

The bearing pieces 29 can be engaged by the ends of two levers 41 and 42 connected with one another by a shaft 43 supported in the casing of the machine. The shaft 43 is supported in lugs 44 of the cover 2. The lever 42 is provided with an arm 45 which is turnable by means of a slide 46 extending above the casing and provided with a notch 47 serving to lock the lever 45 and thereby also the levers 41 and 42 in the position indicated in Fig. 1 by dotted lines. In this position the bearing pieces are so much lifted in their guides, counter to the pressure exerted by the springs 30, that the bristles of the brush rollers do no more project over the bottom member 31 of the nozzle.

The brush roller consists substantially of two semi-cylinders 48 connected with one another by screws 49 penetrating the shaft 28.

The casing 1 is provided with an opening 51 which terminates into the channel 17 and can be air-tight closed by a lid 50. A suction hose provided with a connection branch (not shown) can be inserted into said opening. Below the opening 51 is a flap 52 attached to the casing 1 by means of a hinge 53. This flap is turned into the position shown in dotted lines in Fig. 1 when the above-mentioned hose connection branch is inserted into the casing through the said opening 51.

When the machine is moved in the direction indicated by the arrow III the rolls 9 and 15 rotate in the direction indicated by the arrow IV. As the roll 9 is directly connected with

the driving wheel 33 it is rotated in the same direction and as the change-wheel 38 is inserted between the roll 15 and the driving wheel 32 this wheel is rotated in the reverse direction, i.e. in the direction indicated by the arrow I (Fig. 1). When this takes place, the free-wheel 43 drives the shaft 28. When the machine is moved counter to the arrow III the free-wheel 35 turns the shaft 28 in the direction of the arrow I. When the brush roller 27 is in operative position the dust or dirt is swept by it in the direction to the suction slot 20 which is always open, as the lower rim of the wall 19 lies a few millimeters above the plane determined by the nozzle bottom 31.

To throw the brush roller out of gear a pressure upon the slide 46 suffices to move the roller out of the range of said bottom 31 and to lock it in this position, if so desired.

Adjusting the height of the brush roller with respect to the carpet is effected by varying the position of the rolls 9 and 15 relatively to the casing by means of the adjusting members 11 and 12 already mentioned in a preceding paragraph of the specification.

If the machine shall be employed merely for sucking dust from any article of furniture or the like, the lid 50 is removed and the nozzle of the suction hose inserted into the opening 51 whereby the flap 54 will be compulsorily moved into the position shown in dotted lines and the channel 17 will, therefore, be closed so that the suction device draws the dust-laden air solely through the hose.

FRIEDRICH EISENLOHR.

PUBLISHED

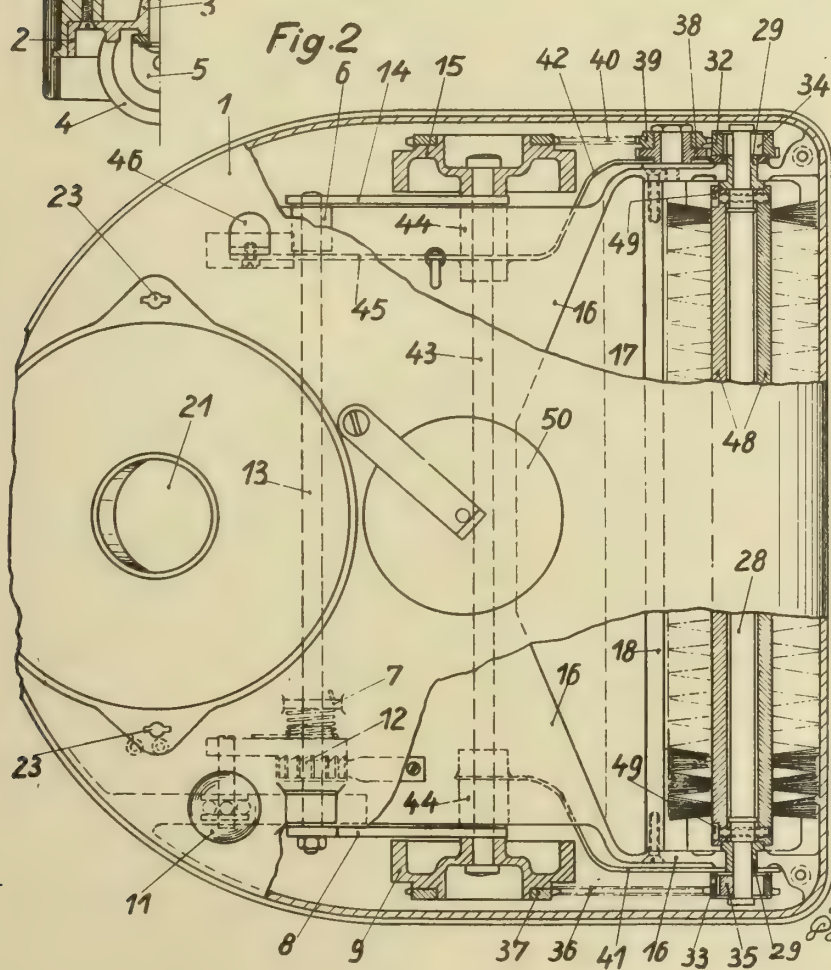
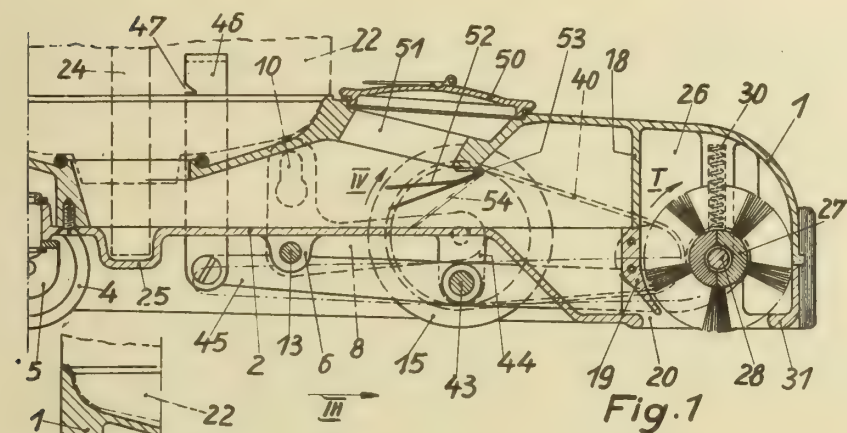
F. EISENLOHR

Serial No.

APRIL 27, 1943. COMBINED CARPET SWEEPER AND DUST EXHAUSTOR 344,417

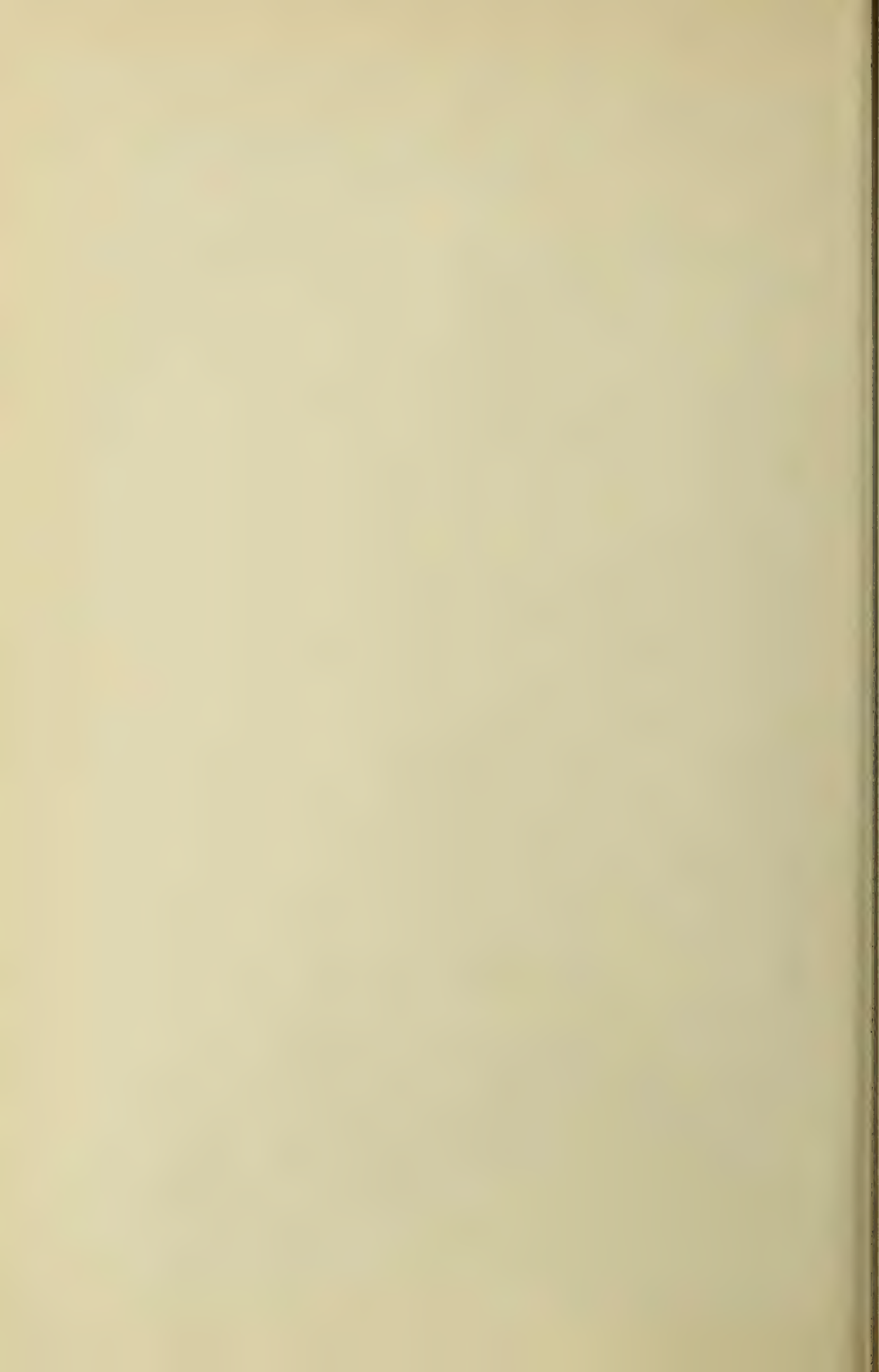
BY A. P. C.

Filed July 8, 1940



Inventor
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By:
Glascock
Parrish & Seebold
Attys.



ALIEN PROPERTY CUSTODIAN

INSULATED CARBON BODY

Ottmar Conradty, Rothenbach on the Pegnitz,
Germany; vested in the Alien Property Custodian

Application filed July 8, 1940

This invention relates to artificial carbon bodies including an insulating support for mounting, and to a process of making such articles.

In various branches of the electrotechnical industry, carbon bodies are required which either have to be insulated from each other or from another part of a machine or apparatus, such articles being, for example, carbon collectors and carbon slip rings as well as other carbon contacts operating under high electrical load and reaching high working temperature. The conventional insulating materials, such as, cement, are destroyed and decomposed at the high temperatures in question, more particularly by function of electric sparks, and converted into electric conductors, whereby they become useless as electric insulators and mechanical supports for the carbon bodies.

It is an important object of the present invention to provide a carbon body and insulator unit the insulation of which is capable of resisting extreme electric and heat stresses.

With this and further objects in view, as may become apparent from the within disclosures, the invention consists not only in the structures herein pointed out and illustrated by the drawings, but includes further structures coming within the scope of what hereinafter may be claimed.

The character of the invention, however, may be best understood by reference to certain of its structural forms, as illustrated by the accompanying drawings in which:—

Fig. 1 is a perspective sectional view of a carbon and insulator unit, having the invention applied thereto.

Fig. 2 is an outside perspective view of the same unit.

Fig. 3 is a side elevation of another carbon and insulator unit having the invention applied thereto.

Fig. 4 is an end view of Fig. 3.

Fig. 5 is an axial section of Fig. 3.

Similar reference numerals denote similar parts in the different Figures.

Referring now to the drawings in greater detail, and first to Figs. 1 and 2, a carbon body 1 is formed with a cylindrical projection 2 fitting into a central recess 3 in an insulating body 4. The manner in which the insulating body may be applied to the carbon body will hereinafter more fully appear.

In Figs. 3 to 5, an annular carbon body 5 is mounted on a tubular insulating body 6. Buffer materials 7, consisting, for instance, of asbestos or slag wool, may be provided between the car-

bon body and the collars 8 of the insulating body adjacent thereto, in order that mechanical shrinking tensions caused by the cooling down of the insulating body may not be transferred upon the carbon material.

The manufacturing process will now be described.

I apply the insulating material on the carbon body under action of heat, in a burning, baking or casting operation. I have found that an insulating material which can be subjected to a treatment of this kind will resist also to the stresses occurring in working order by sparking and heat.

Various insulating materials may be used which can be applied by heat. Depending on the kind of insulating material the same is applied on the carbon before the same has been burnt, or after the preliminary annealing or after the hardening or final annealing.

It is then hardened and solidified by heat. Where the insulating material is applied on the carbon before the burning or before the hardening-on, the carbon will be hardened-on during the heat treatment of the insulating material. On the other hand, where the carbon has been fully annealed already, it will undergo a second annealing process with the insulating material applied thereon. This is by no means objectionable, but on the contrary the properties of the carbon may be modified by the second annealing process in any desired manner.

In the practice of my invention, I may for instance produce a carbon body in known manner by compression, then I press a ceramic insulating material, for instance, steatite, around the carbon body, using a suitable mold and finally the composite body obtained by pressing together the two parts is subjected to a common burning or baking process. It will be appreciated that the shrinking characteristics of the two substances which are being used have to be matched with each other in a suitable manner. Where large differences are existing in the shrinkage of the two materials, namely, carbon and insulator, the compressed carbon may be pre-annealed to such a degree, that in the common final annealing process (hardening-on) it does not shrink more than the insulating material pressed around it after the pre-annealing or first annealing. Again, the ceramic insulating body may be first shaped and pre-annealed, then united with the hardened-on carbon and then the whole unit may be annealed once more up to the temperature

causing maximum shrinkage of the insulating body.

According to a further feature of the invention, the insulating body may consist of vitreous substances, more particularly, glass, which is cast or die-cast upon or around the suitably formed carbon body in a molten and liquid condition. In the same manner, any smelting flux of the glass or enamel type or smeltable blast furnace slag may be applied.

According to another feature of the invention, I may use a ceramic material which contains suitable flux or frit admixtures and therefore does not require a real burning process but is pressed around the carbon body in powdered form and then subjected merely to a sintering process which may consist in the simultaneous application of pressure and heat. Substances which may be sintered in this manner, are, for instance, glass dust, and slag meal. The solidi-

fication of the insulating material by a sintering operation without pressure or with simultaneous application of pressure offers the advantage that the differences of expansion or shrinkage of the two materials are less than with a conventional ceramic process. In most instances, it will be advantageous to provide bolsters, as at 7 in Fig. 5, between the carbon and insulating material, to compensate the considerable pressures due to shrinkage of the insulating material.

The method and apparatus of the present invention have been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described and illustrated in the drawings.

OTTMAR CONRADTY.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

O. CONRADTY
INSULATED CARBON BODY
Filed July 8, 1940

Serial No.
344,455

Fig. 1

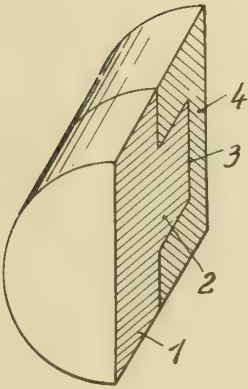


Fig. 2

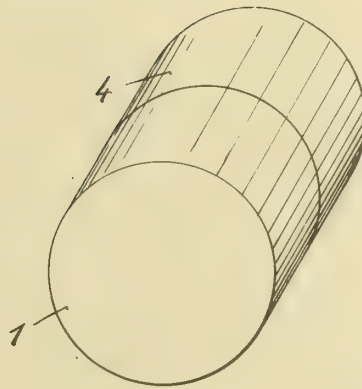


Fig. 3

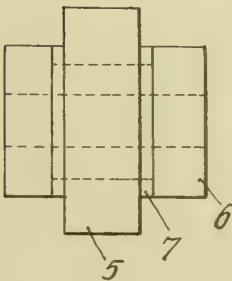


Fig. 4

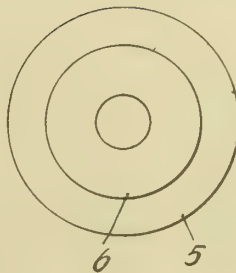
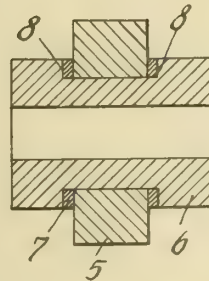
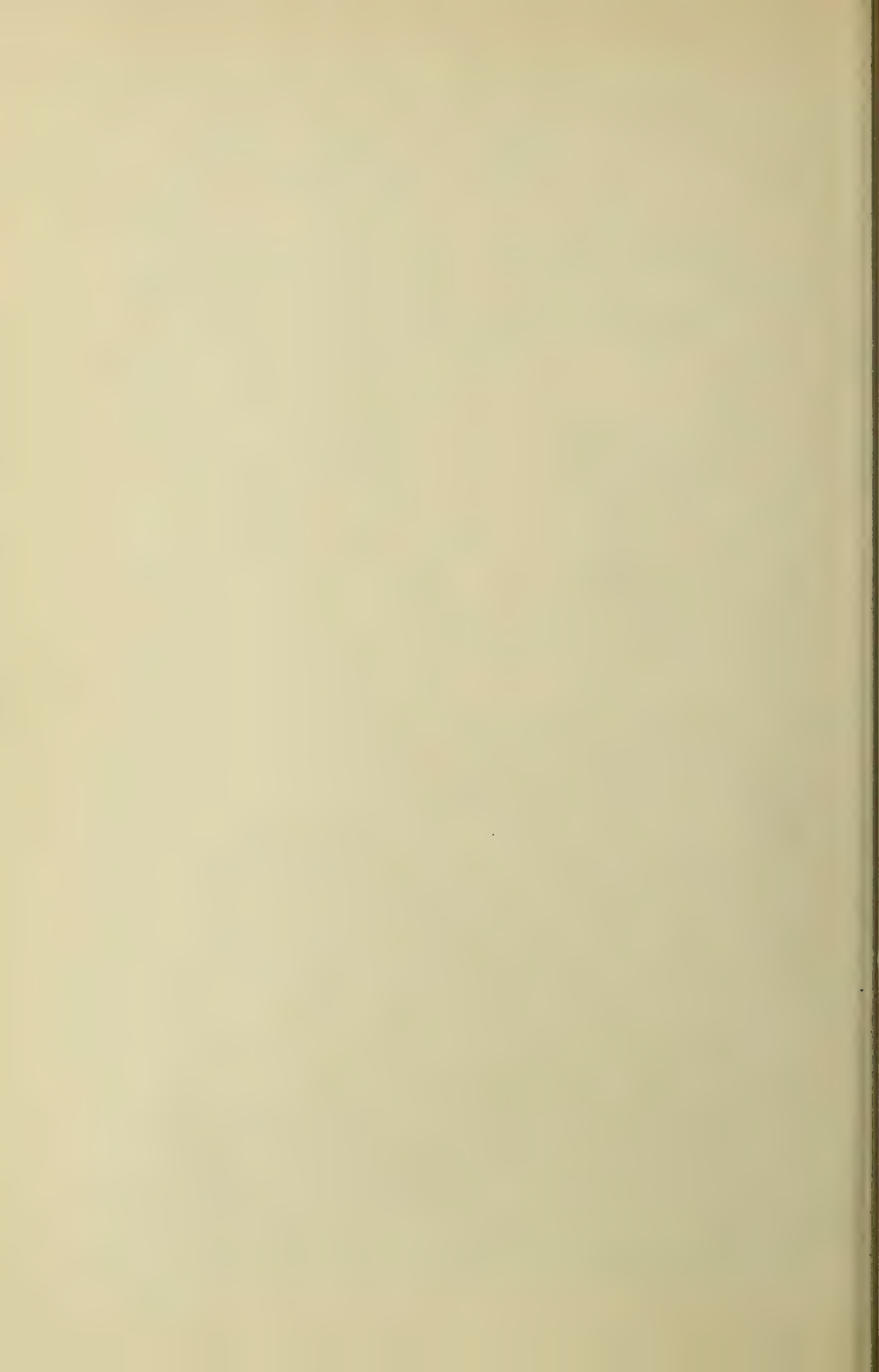


Fig. 5



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Ottmar Conradty
By *Young, Egan & Thompson*
Attorneys



ALIEN PROPERTY CUSTODIAN

MANUFACTURING MALE MEMBERS OF SNAPS

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Japan; vested in the Alien Property Custodian

Application filed July 23, 1940

This invention relates to a method of manufacturing male members of snaps by moulding from thermo-plastic material such as celluloid, and has for its object to manufacture male members of snaps by simple process of press-moulding without need of split moulds.

Another object of this invention is to provide a method of manufacturing a great number of male members of snaps by a single press-moulding operation.

A further object of this invention is to obtain male members of snaps made from celluloid material and the like, which material enables the members to have desirous and various colourings.

There are other objects and particularities of this invention, which together with the details thereof will be described later, reference being made to the accompanying drawings, in which:

Figure 1 is an enlarged sectional view of a male member of snap made in accordance with this invention.

Fig. 2 is a perspective view of a mould utilized in accordance with this invention.

Fig. 3 is an enlarged and fragmentary sectional view taken along the line III—III in Fig. 2.

Fig. 4 is a sectional view of the mould, press and mouldable materials as prepared ready for press-moulding operation, the showing being somewhat diagrammatic.

Fig. 5 is a view similar to Fig. 4, the parts being shown in the position just after the pressing operation completed.

Fig. 6 is an enlarged and fragmentary sectional view of a piece of product from the press-moulding operation in accordance with this invention, from which product the male members of snaps or the final product of this invention are obtained by simple cutting or punching operation.

In Fig. 1 is shown a male member A of snap button made from celluloid by press-moulding in accordance with this invention. It has a disc-like base portion b, a neck portion c centrally projecting from the base portion b at a right angle thereto, and a somewhat spherical head portion d having a diameter substantially larger than that of the neck portion c. The general shape of the member A itself is not new at all, and it has a plurality of through holes e in the base portion b for the purpose of sewing it on an object as usual.

In accordance with this invention, a plate like mould 1 (Figs. 2 to 5 inclusive) is utilized. The mould 1 is provided with a number of mould cavities 2 arranged in rows and columns in one side of the plate 1, the cavities being formed by machining the material of the mould 1. Each mould cavity 2 consists of a base portion 3 corresponding to the base portion b of the member A, a neck portion 4 corresponding to the neck portion c of the member A, and a head portion 5 cor-

responding to the portion d of the member A. within the base portion 3 of each mould cavity are planted a plurality of pins 6 for the purpose of forming the sewing holes e in the member A. The pin 6 preferably has such a height that a minute portion of the top end projects beyond the general plane of the mould plate 1 as clearly shown in Fig. 3, for the purpose described later.

The mould plate 1 is disposed within a press machine 7, and thermo-plastic material B such as celluloid are placed on the mould plate 1. A second mould plate 8 is then placed on the material B. The plate 8 has substantially the same dimension with the plate 1 except the thickness. The plates 1 and 8 are preferably made of brass, and the plate 8 is so thin that it has an adequate flexibility for the purpose shown later.

The heating of the thermo-plastic material B is effected by means of a massive heat plate 9 made of iron, which is heated to a suitable temperature before being placed in position within the press machine 7 as shown in Fig. 4. When celluloid is used, the temperature to which the heat plate 9 is heated is about 200° C. By the heating effect from this plate 9, the material B is made plastic, and by the pressing operation effected through the press-head 10 which is connected to a suitable operating mechanism, not shown, the plastic material is forced to flow throughout the space between the mould plates 1 and 8 as well as into the mould cavities 2. The pressing operation is limited by the pins 6 which about the undersurface of the mould plate 8, as shown in Fig. 5. It is understood that there is a very thin portion f of the moulded material spreading over and between the opposite surfaces of the plates 1 and 8, the thickness of this thin portion f being determined by the height of the pins 6 which project beyond the upper surface of the mould plate 1. It is to be understood that the limiting of pressing operation which determines the thickness of the thin portion f may otherwise be provided by means of any other kind of stop members associated with the press machine.

During the pressing operation, the appropriate temperature of various parts were measured as follows, the material being celluloid:

| | |
|---------------|-----|
| | °C. |
| Heat plate 9 | 165 |
| Mould plate 1 | 140 |

After the pressing is over, it is preferable to leave for a while, say two seconds, and then soft water, preferably soap water, is poured upon the heat plate 9. Before the pouring, the temperature of plates 9 and 1 were measured as about 110° C., and the plates are cooled to about 80°C. by the water pouring. Just after the above cooling, the brass plate 8 and the film like portion f of

the moulded product are picked up together at edge portions, and stripped from the mould 1. At the warm condition, as above-mentioned, of the product, the material has a suitable elasticity that the head portion *d* of each snap member A' connected by the film like portion *f* is allowed to pass through the reduced neck portion 4 of each mold cavity 2, without being collapsed permanently; that is to say, after passing through the neck portion 4, the head portion *d* recovers its original shape automatically.

After stripped off, the plate 3 together with the product are thrown into water for a further cooling, and the product can easily be stripped from the plate 3, the product being a number of snap 15

members A' connected together by the film like portion *f* of the material, as fragmentarily shown in Fig. 6, from which product individual snap members A are cut or punched off in any suitable and well-known manner.

When the pins 6 do not project beyond the upper surface of the mould plate 1, and the pressing operation is limited by any other stopping means, a thin film of the material will be leaved at the bottom end of each sewing hole *e* of the snap members, but such films do not cause any inconvenience for sewing operation, because they can be easily penetrated by sewing needles.

JUZO MORITA.

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J. MORITA
MANUFACTURING MALE MEMBERS OF SNAPS

Filed July 23, 1940

Serial No.
346,897

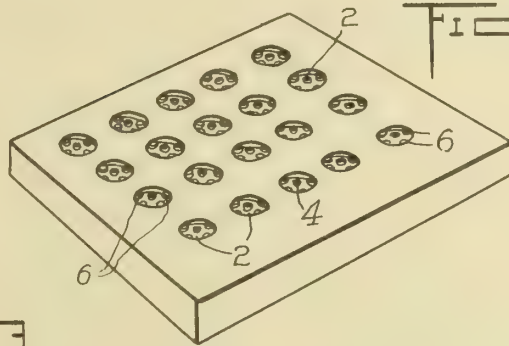
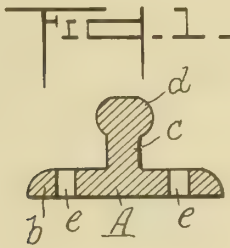


Fig. 3.

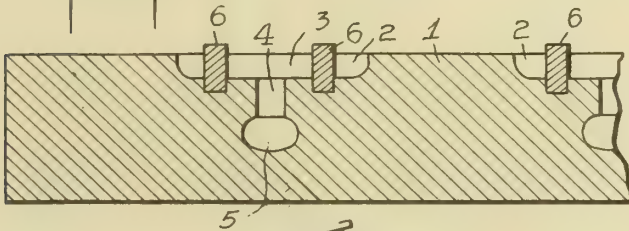


Fig. 4.

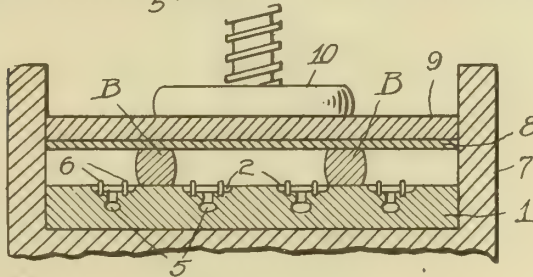


Fig. 5.

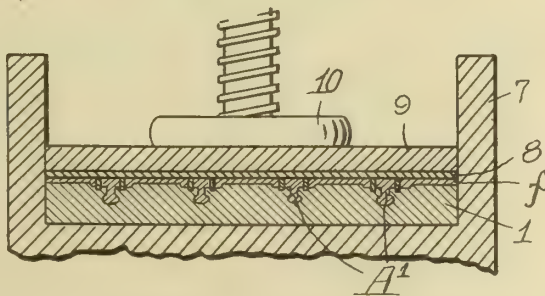
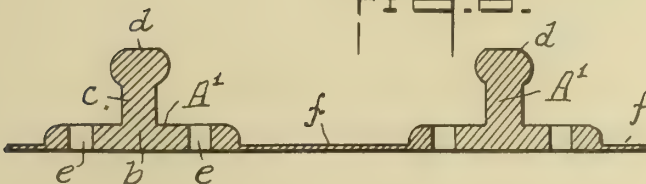


Fig. 6.



Juzo Morita
INVENTOR
BY *[Signature]*
his ATTORNEY

ALIEN PROPERTY CUSTODIAN

PROCESS OF PRODUCING MAGNESIUM
OXIDE

Wilhelm Moschel and Willi Forst, Bitterfeld, and
Walther Schmid, Stassfurt, Germany; vested in
the Alien Property Custodian

No Drawing. Application filed July 23, 1940

This invention relates to a process of producing magnesium oxide of uniformly high reactivity.

It has already been observed (cf. e.g. Steiner und Hüttig, "Die Abhängigkeit der katalytischen Wirksamkeit verschiedener Magnesiumoxyde von ihrer Darstellungsart und Vorgeschichte" in "Die Kolloidzeitschrift", Vol. 68 (1934), p. 253 et seq. and Fricke und Lücke "Wärmeinhalt und Gitterzustand aktiver Magnesiumoxyde" in "Zeitschrift für Elektrochemie", Vol. 41 (1935), p. 174 et seq.), that the reactivity of magnesium oxide obtained by heating magnesium carbonate or magnesium hydroxide to high temperatures differs depending on the conditions under which it has been produced. In these experiments, the reactivity was expressed in terms of the capability of the magnesium oxide produced, to catalyze the reaction $2\text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2$, or of its heat of hydration; however, the reactivity of magnesium oxide is also of importance in certain other chemical reactions such as e.g. the production of magnesium oxychloride by reaction of magnesia with magnesium chloride lye or with fused hydrates of magnesium chloride; a similar case is the production of anhydrous magnesium chloride by the treatment of magnesia with chlorine in the presence of carbon. As a general result of these observations it was stated that the reactivity of the product is the higher, the lower the temperatures at which the originating material was treated.

The present invention contemplates a process for the production of magnesium oxide having a high chemical reactivity and particularly of a product consisting of particles of uniformly high reactivity. The process may be applied to all magnesium compounds which, under the action of heat, are converted into magnesia.

It has been ascertained that in order to obtain magnesia having the maximum uniform reactivity, it is mainly important to start from originating magnesium compounds which have been ground to a substantially uniform grain size, the size of the individual grains being so small that

(a) all parts of the grain, by virtue of the heat imparted to the grain during the heating stage, attain the desired temperature practically simultaneously; in this manner substantial differences in the properties of the elementary particle constituting the grain, which would otherwise occur as a result of the different length of time during which such elementary particles are exposed to the heating temperatures, are avoided.

(b) maximum reactivity is attained so rapidly that the grain size does not yet become substan-

tially modified; in explanation it may be observed that the increased reactivity takes place the more rapidly, the smaller the grain, and further, that during the heating stage a progressive agglomeration of the individual grains to larger complexes takes place, which, in turn, results in a decrease of reactivity. Requirement (b) therefore means in effect that maximum reactivity, in respect of each individual grain must already be attained before the unavoidable agglomeration of the grains progresses to such an extent as to substantially diminish the reactivity of the product.

When employing originating materials of a uniform grain size determined by the aforesaid requirements, it has been found that the best results, in respect of reactivity of the product, are obtained when applying extremely high heating temperatures, higher than 700°C . up to about 1100°C . the treatment in that case being extended only for so long that at least a substantial, and preferably a practically complete dissociation of carbonic acid or water of hydration, as the case may be, takes place, while at the same time the maximum reactivity, which on further extending the treatment would be impaired, is still preserved.

The basic principles outlined above are somewhat opposed to the conceptions formerly ruling: The latter maintained that low heating temperatures would result in a product having the maximum reactivity, while it has now been found that it is just the extremely high temperatures which lead to this result; moreover it is seen that, provided the originating materials are substantially finely and uniformly ground, it is possible to produce a product combining maximum reactivity with practically complete—or at least substantial—dissociation of carbonic acid and water of hydration; this is achieved by selecting a sufficiently high heating temperature and sufficiently short duration of treatment.

The present invention therefore consists in a process for the reduction of magnesium oxide of high chemical reactivity, which comprises heating to a temperature of about 800°C . to 1100°C . a magnesium compound of the group consisting of magnesium hydroxide and magnesium carbonate having a substantially uniform grain size which is so small that all parts of the grain, by virtue of the heat transmitted to the grain during the heating stage, attain the desired temperature practically simultaneously and the maximum reactivity is attained so rapidly that the grain size does not yet become substantially modified.

The quality of the products may, in accord-

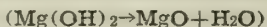
ance with the present invention, be further substantially improved by removing the product, after dissociation has taken place, as rapidly as possible out of contact with the high temperatures and the gaseous dissociation products.

Several modes of carrying out the invention may be employed in actual practice: Thus it is equally possible to heat-treat the material, ground down to the critical grain size, in a reaction chamber from without and also to resort to internal heating. In each and every case it is only essential to select a suitable combination of temperature and duration of heat treatment. In the latter case it is of particular advantage to inject a stream of the ground originating material into the reaction chamber in the form of a spray by means of a gas which not only acts as a carrier for the material but also, by its own combustion, furnishes the heat required for the treatment.

The grain size which is critical with a view to obtaining products of high reactivity in accordance with the foregoing is of the order of about 10,000 mesh/sq. cms; this grain size is thus substantially smaller than that obtainable by grinding processes hitherto usually employed on a commercial scale. In order to avoid the effects of a prolonged exposure to the high heat and to the effects of the gaseous dissociation products, the magnesia obtained may be chilled by injecting a cold current of inert gas into the reaction chamber and/or the particles may be precipitated by means of precipitating electrodes.

Examples

1. Into a rotary furnace equipped with a stirring mechanism consisting of two sets of paddles disposed on shafts turning in opposite directions, and heated to 800° C. from without, the furnace having a length of 4 ms. and an inner diameter of 0.5 ms., 100 kgs. of precipitated magnesium hydroxide and dried at 125° C., having a grain size below 10,000 meshes per sq. cm., are poured and passed through the furnace while energetically stirring in such a manner that the duration of passage amounts to about 2 minutes. On issuing from the furnace, the product is carried into a closed cooling drum in which it is rapidly chilled. The original water content



of about 30% has been reduced to about 5% in the final product. On contact with magnesium chloride lye of a specific gravity of 1.3, the product sets within 2 minutes, the temperature of the mixture rising to 100° C. in the course of 10 minutes; this indicates that the product possesses an extremely high reactivity.

2. In a similar manner and with the aid of the

apparatus described above, 100 kgs. of ground raw magnesite (grain size below 10,000 mesh per sq. cm.) are treated at a temperature of 1100° C. The initial CO₂-content of the material which amounted to 42% of the total is thereby reduced to about 10%. The product obtained displays similarly favourable properties to those described above in relation to that obtained from magnesium hydroxide.

3. A rotary tube of 1.5 ms. length and 50 mms. internal diameter, provided with an external heat insulating layer, is equipped, at its one end, with a gas bracket protruding over a length of about 300 mms. into the tube in an axial direction, the bracket consisting of an inner tube of 30 mms. diameter and a concentrically disposed external tube of 40 mms. diameter somewhat in the manner of an oxyacetylene blow pipe. The opposite end of the reaction tube extends into a vertically disposed tubular sink of 2 ms. length and 200 mms. internal diameter, the upper end of which connects with another vertical tube in which precipitating electrodes are disposed. Through the outer tube of the blow pipe device, 40 cubic metres per minute of illuminating gas of 7700 BTU are injected, while through the inner tube 115 cubic metres per minute of a suspension of magnesium hydroxide in air are blown in; the latter suspension is prepared by grinding magnesium hydroxide to a fineness of below 10,000 mesh per sq. cm. and suspending 150 grs. of the product obtained in every cubic metre of air by means of a rotary plate. The gases issuing from the blow pipe are then ignited. The reaction tube revolves with a speed of about 3 or 4 revolutions per minute. The dehydrated product issuing from the latter enters the tubular sink, in which a small fraction consisting of not completely dehydrated raw material particles sinks to the bottom owing to their higher specific gravity, whilst the bulk of the material consisting of dehydrated particles is carried in an upward direction by means of the combustion gases and precipitated on the precipitating electrodes in the upper extension of the tubular sink. The temperature was measured immediately at the point of ignition at the end of the blow pipe amounts to 1100° C. and the period during which the reaction material remains in the heated zone of the reaction tube is of the order of $\frac{1}{16}$ of a second. On contacting the product obtained with magnesium chloride lye of 1.3 specific gravity, setting takes place immediately (duration of setting immeasurably short), and the temperature of the setting mixture rises to 100° C. within 3 minutes.

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ALIEN PROPERTY CUSTODIAN

METHOD FOR THE REMOVAL OF CARBONIC OXIDE FROM GASES OR MIXTURES OF GASES CONTAINING SULPHUR COMPOUNDS BY A CONTACT PROCESS WITH STEAM CATALYSIS

Richard Brandt, Berlin S. 42, Germany;
vested in the Alien Property Custodian

Application filed July 25, 1940

This invention relates to a method for the removal of carbonic oxide from gases or mixtures of gases containing sulfur compounds by a contact process with steam catalysis. The invention is an improvement in or modification of the process of my copending patent application Serial Number 202,130, filed April 14th, 1938.

In carrying into effect the method forming the subject of said prior application it has been found that in order to obtain a certain and extensive conversion of the carbonic oxide into carbonic acid by means of steam particular stress must be placed on as uniform a loading as possible of the converter plant. In most cases the installation for the performance of the method will be directly connected to a gas work or coke plant as in this way costly intermediate receptacles for storing the initial gases are avoided. In carrying out the operation in this way a certain difficulty exists in maintaining constant the saturation with steam and obtaining a very extensive and certain conversion of the carbonic oxide on catalysis, as varying delivery of the initial gases to be treated, both as to the quantity and the composition, must be taken into account.

The invention provides a method of avoiding these difficulties by compensating the variations of the unpurified initial gases still containing sulphur which are caused in particular by the furnace house operation. According to the invention this result is attained by adding to the initial gases a corresponding portion of the stream varying in quantity of already converted gases and thereby bringing their total quantity to a constant amount. If for example the maximum delivery of furnace gas is 600 cubic metres and if the amount being delivered falls below this maximum amount at certain times for example in discharging and recharging chambers in the furnace house or in the known wet operation by gasification of coke in the retorts with steam, then by means of this returned partial flow the quantity required to make up the amount to the maximum delivery of 600 cubic meters is supplied so that a constant loading of the conversion plant and a constant steam saturation of the gases to be converted is attained.

In the application of the new method a particular effect is also obtained by balancing also the varying carbonic oxide content in the initial gases. This is based upon the fact that during the time that the gas development is particularly vigorous, as for example after a fresh charging of the furnace chambers, the CO content of the initial gases is at a minimum. In the above men-

tioned example the CO content of the initial gas amounts to 11.9 percent in case of the said maximum delivery of 600 cubic metres per hour. During this maximum supply of furnace gas there is little or no addition of converted gas. Consequently, the CO content of the gas passing through the conversion is the same as that of the initial gas. During the time of minimum supply of furnace gas, as for example at the end of a degasification period, the CO content is generally at a maximum and in the above mentioned example is about 14.4 percent. During this period, an increased addition of CO-poor converted gas takes place. If the quantity of initial gas amounts to 500 cubic metres, as stated above, 100 cubic metres per hour of converted gas containing 1 percent CO only are supplied to the initial gas (preferably with the aid of an automatic governor controlling the circulation). As a result, the CO content is reduced, i.e., in the case of the present example, from 14.4 percent by volume to about 12 percent. The process of the present invention makes it possible to realize a substantial balancing of CO fluctuations in the initial gas to be converted.

In comparison with prior known processes for the removal of carbon monoxide, wherein there is no partial return of converted gas and wherein, consequently, the gas to be converted has a fluctuating CO content so that, with a constant supply of steam, the treatment at times is carried out with an excess of steam, the process of the present invention presents the advantage that the CO conversion takes place with an appreciably smaller quantity of contact material and with a smaller quantity of steam. In addition, with a uniform loading of the contact and with a uniform steam content in the gases, water gas balance is realized more rapidly and more completely.

It has been found to be advantageous in carrying out the process of the invention to precede the return of the circulating gas to the initial gases by a washing out from the circulating gases of the carbon dioxide produced during conversion.

In order to attain the desired favourable actions the circulating gas need not be admixed with the pre-cleaned furnace gases in the usual manner. The admixture in fact can be effected on the low pressure side of a gas inducer, for example, which draws off the furnace gases and forces them through the usual cleaning apparatus of a gas work. In this case the same gas feeding machine can also naturally be used in

order to force the gas also through the converter plant and the remaining apparatus connected therewith. A uniform loading of all the apparatus serving for the further treatment of the furnace gases is thereby attained with minimum expenditure of power. It is also desirable to add the oxygen necessary for the additional heating of the steam-gas mixture at the initial contact on the low pressure side of the gas suction apparatus in order to be able to carry out more satisfactorily with excess of oxygen in the purification of iron oxide the preliminary removal of hydrogen sulphide from the gases to be converted.

It should be noted that the method can be carried out also under pressures higher than 1 atmosphere where such a method appears more economical in particular cases.

Example

One mode of carrying my novel process into effect will now be described by way of example and with reference to the accompanying drawing.

A carbon gas purified from hydrogen sulphide in known manner, for instance, by means of an iron oxide purifying substance, not shown, and containing about 6.5 percent carbon monoxide and 0.4 percent oxygen is forced from the furnace house through the pipe line 1 and the compressor 2 into the saturator 3 in order to be depoisened. In the saturator, the gas is rinsed with hot water supplied from a scrubber 16, as indicated at 4, and, if desired, by direct addition of steam through a pipe 5, so as to saturate it with steam to a dew point of about 65 to 75°C. The gas leaving the saturator with a temperature of about 75°C is directed, through a pipe 6, into the heat exchanger 7 and preheated to about 320°C, and then, through a pipe 8, into a contact furnace 9 having three compartments 10, 11 and 12. Provided in the topmost chamber 10 is a contact, preferably containing copper, and consisting, for instance, of pumice stone on which about 10 percent cupri-oxide are deposited, preferably on its surface.

In the compartments 11 and 12 there are provided contacts of a different composition from the contact in chamber 10, preferably a contact containing chromium and iron, for instance, an iron-chromium contact consisting of 96 to 98 percent of iron oxide and 2 to 4 percent of chromium oxide. The gas and steam mixture, preheated to 320°C, at first passes through the contact of chamber 10, being preheated to about 370°C owing to the oxidation which is favoured at this contact. Following this the gas and steam mixture which is extensively freed from oxygen passes through the contact chambers 11 and 12 in which the steam reaction is taking place. Since the temperature of the gas and steam mixture after passage through the contact 11 rises to about 420°C, it is desirable to reduce the temperature of the reaction mixture before it enters into the

chamber 12, by adding non-superheated steam or condensed water through a pipe line 13, so that the gas leaving this chamber has a temperature of about 380°C. The gas and steam mixture leaves the contact furnace at its lower end and is directed through the pipe 14 into the heat exchanger 7 for heating the steam-saturated carbon gases, and then the converted gas mixture having a temperature of about 110°C is directed through the pipe line 15 into the scrubber 16 wherein it is cooled down by water supplied through a pipe 17. As mentioned above the water discharged from the scrubber through pipe 4 is used for saturating the furnace gases coming from the compressor, while the converted gas discharged through line 18 passes into a cooler 19 and is cooled therein by water fed at 20. The cooled gas is then directed, through a pipe 21, into a CO₂-washer 22. The main quantity of the gas freed from CO₂ then is directed through a pipe 23 into a further cooler 24, cooled down to the desired temperature by means of water fed through a pipe 25, and discharged through a pipe 26.

The compressor 2 is adjusted in such a manner as to force through the plant a uniform quantity of gas corresponding to the maximum output of gas supplied from the furnace house through the pipe line 1. Now, if for any reason there is produced in the furnace house less than this maximum quantity of gas for which the condenser has been adjusted, the compressor 2 automatically draws the balance from the carbon dioxide washer 22, through the pipe line 27 and regulator 28 which permits passage of gas in the direction of arrow 29 only. In this manner it is achieved that a constant amount of gas is permanently circulating through the whole converter plant. Inasmuch as the content of carbon monoxide in the furnace gas is approximately inversely proportional to the quantity of gas produced in the furnace house, it is also achieved that a gas mixture is forced through the converter plant having a substantially constant CO content which in the present case amounts to about 6.5 percent.

The method of the present invention has been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

This is a continuation in part of my co-pending patent application Ser. No. 216,348, filed June 28th, 1938, entitled: Method for the Removal of Carbonic Oxide from Gases or Mixtures of Gases Containing Organic Sulphur Compounds etc.

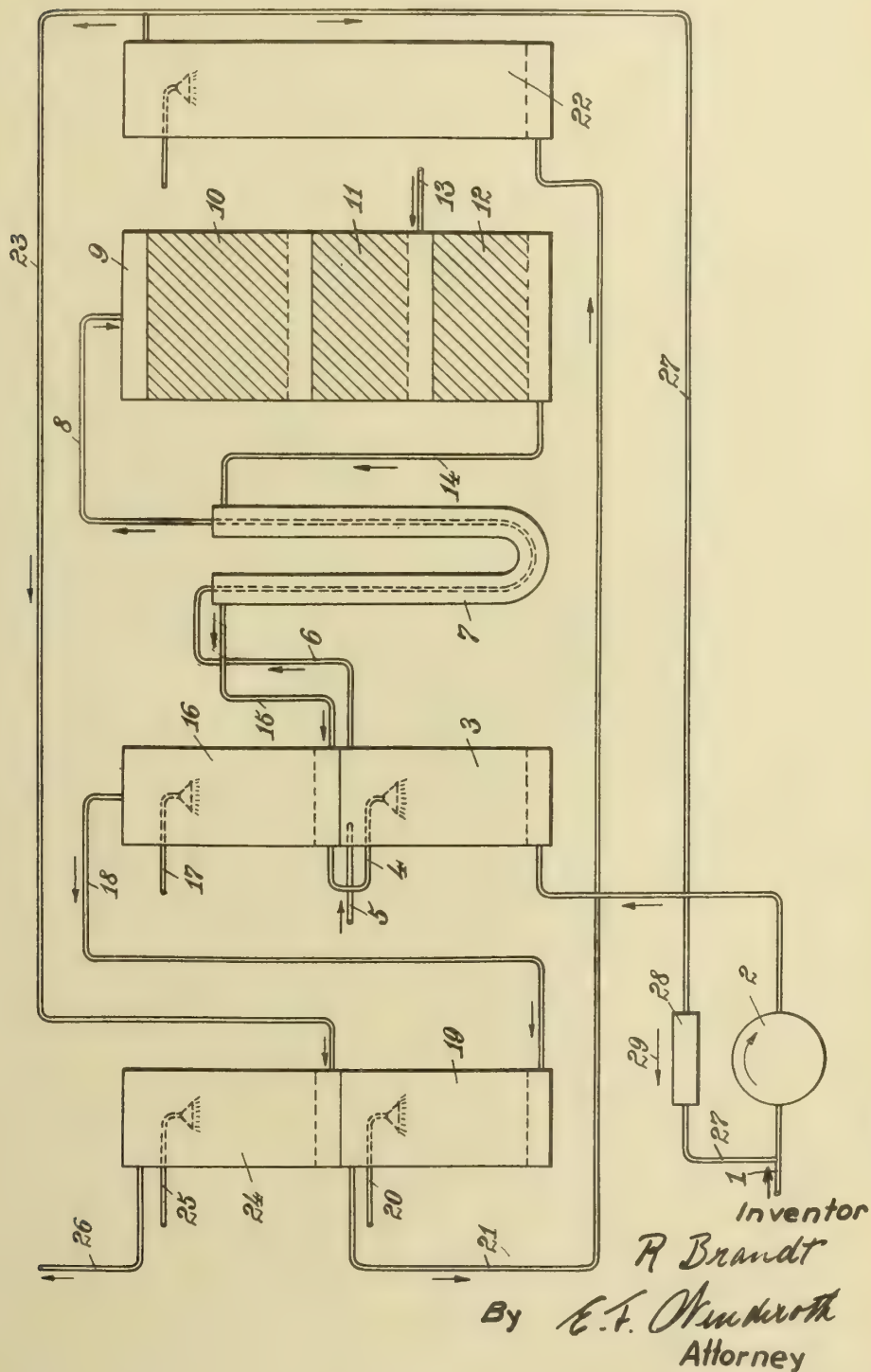
RICHARD BRANDT.

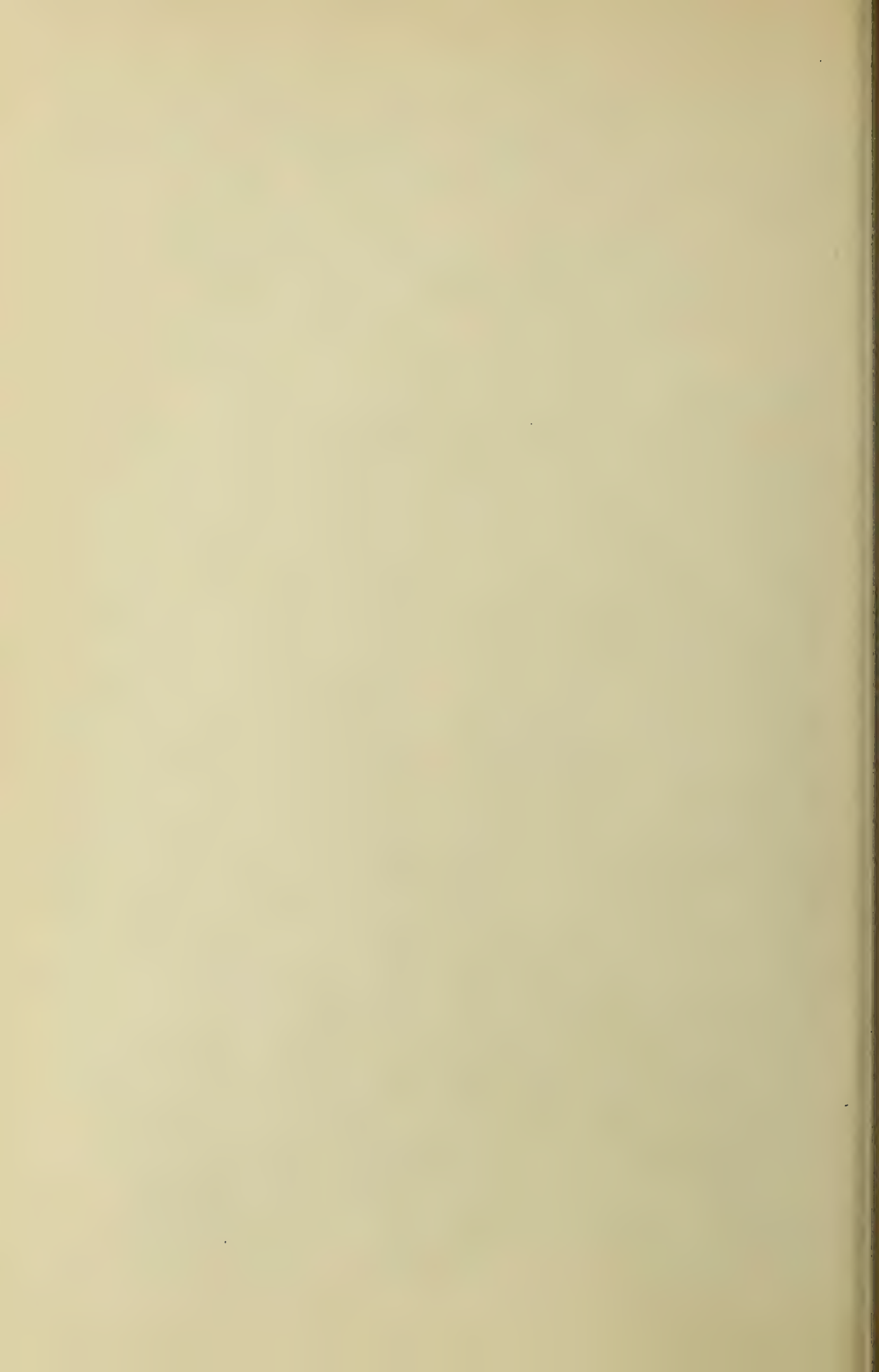
PUBLISHED
APRIL 27, 1943.

BY A. P. C.

R. BRANDT
METHOD FOR THE REMOVAL OF CARBONIC OXIDE FROM
GASES OR MIXTURES OF GASES CONTAINING
SULPHUR COMPOUNDS BY A CONTACT
PROCESS WITH STEAM CATALYSIS
Filed July 25, 1940

Serial No.
347,565





ALIEN PROPERTY CUSTODIAN

CONICAL BELTS

Johann Meyer, Berlin-Steglitz, Germany; vested
in the Alien Property Custodian

Application filed July 25, 1940

This invention relates to conical belts of the type consisting of a strip of material having free ends which are subsequently joined at their ends to form an endless belt, as distinct from conical belts which are directly produced in the form of closed rings. Conical belts, owing to their large transverse section, are exposed to high bending forces emanating from the bending around small pulleys. The highest amount of such detrimental bending forces is found in belts which, like conical belts with free ends made of rubber or rubberized texture, are manufactured or vulcanized in the form of straight rods or strips.

The detrimental bending forces are less pronounced in the case of endless conical belts of rubber or rubberized texture, which are mostly manufactured and vulcanized in circular moulds the circumference of which equals the evolved useful length of the belt. A conical belt thus vulcanized represents a self-enclosed circle the bending radius of which in its tension-free state of manufacture is always dependent upon the actual length of the belt. It follows that belts with equal cross section can yet show largely varied bends in their tension-free state, depending upon the respective length of the belt, although said belts of equal cross section are running around the same pulley of smallest diameter.

The greater the length of a belt thus manufactured or vulcanized, the more unfavourable will be its bending ratio from the tension-free state of manufacture relative to the bend which it must make around the smallest pulley. With its length increasing, the belt will approach the most unfavourable state of the straightened form and the maximum of the detrimental inner bending forces at the point where it runs over the respective smallest pulley.

It is an important object of the present invention to impart to the belt a preliminary bending feature by which the tension in the belt due to these conditions is reduced to a minimum.

Another object of the present invention is the provision of means and methods for producing belts having a bending feature as specified in accordance with the spirit of this invention.

With these and further objects in view, as may become apparent from the within disclosures, the invention consists not only in the structures herein pointed out and illustrated by the drawings, but includes further structures coming within the scope of what hereinafter may be claimed.

The character of the invention, however, may be best understood by reference to certain of its

structural forms, as illustrated by the accompanying drawings in which:

Fig. 1 is a side elevation of a conventional conical belt manufactured in known manner in its stretched original state.

Fig. 2 is a cross section of the same belt.

Fig. 3 is a side elevation of the belt as it is bent around its associated smallest pulley.

Fig. 4 is a diagrammatic view for illustration of the invention.

Fig. 5 is a diagrammatic view indicating the tensions in a belt according to the invention.

Fig. 6 is a sectional view of a mould device for producing conical belts in accordance with the invention.

Fig. 7 is a plan view, partly in an axial section, of the same device.

Fig. 8 is a plan view of the mould and tools cooperating therewith.

Fig. 9 is a fragmentary sectional view illustrating the position of the belt in the mould device.

Similar characters of reference denote similar parts in the different views.

According to the present invention, the strip-shaped belt is produced with an inherent bend the curvature of which in tension-free state corresponds to a smaller circumference than the actual length of the belt in its closed ring-shaped form ready for use. Preferably, the belt strip is made with an inherent bend corresponding to a circle having twice the diameter of the smallest pulley over which the belt runs in operation. This bending has been found to be best from a standpoint of long life and small wear of the belt, which is probably due to the fact that the curvature of a circle with the diameter 2 is the exact mean value of the curvature of a circle with a diameter ∞ and the curvature of a circle with the diameter 1. Assuming that the smallest pulley will have a diameter of approximately ten times the radial height of the belt cross section, which is a generally accepted figure, this would come down to a bend of a radius ten times the radial height of the belt.

Referring now to the drawings in greater detail, and first to Fig. 1, the inner tensions z and d in the upper and lower layers of this belt of known type, made in straight condition, have the value zero in straight condition of the belt. Fig. 3 shows the same conical belt passed around the respective smallest pulley with the radius r . In this position the outer fibres above the neutral layer n are subjected to a pull, the amount of which in the most extreme layer is supposed to be $z=1$, whilst the fibres lying nearest to the axis

of rotation are subjected to the pressure forces $d=1$. When passing into the straight line the forces z and d are zero again.

My novel conical belt on the other hand has been manufactured in such a way that with the bend of the belt having the radius $R=2r$, as shown in Fig. 4, the resulting bending forces z and d equal zero. When the belt is straightened out, the outer or upper side of the belt will be subjected to pressure whilst the inner or lower side will be subjected to pull. Since the bending radius R , with which the inside of the belt is free from tension, has been designated $2r$ and, since the forces emanating from the respective lengthening and shortening of the material are proportional with the bending radii, it follows that the bending forces which take effect during the stretching of the belt are: $d=\frac{1}{2}$ on the outside and $z=\frac{1}{2}$ on the inside.

If a conical belt which has been thus pre-bent is laid around a pulley s having the radius r , the tensions present in the straight line will reverse their signs beyond zero and, referring to Fig. 5, the outmost fibres will be subjected to a pull $z=\frac{1}{2}$ and the innermost fibres to a pressure $d=\frac{1}{2}$.

That part of the total stress of the conical belt emanating from its bend around the smallest respective pulley has therefore by this simple means been reduced to half the value of a belt which is tension-free in the straight line. Its life, other conditions being equal, has thereby been lengthened considerably or there is the possibility of running a belt of equal dimensions over a smaller pulley with the same efficiency and economy.

In order to produce conical belts having the intended bend in their tension-free state, I may vulcanize the conical belt in a suitable apparatus, such as a cylinder having a helical groove of trapezoid cross section. This helical groove is closed by a metal band protruding into it, the pressure of which upon the inserted conical belt is still raised by the expansion of the cylinder body and the enclosed belt due to the heat produced in the vulcanizing operation.

Figs. 6 to 8 show an embodiment of a suitable vulcanizing cylinder. Fig. 9 is a sectional view of the helical groove with inserted conical belt, metal band and pressure cylinder at an enlarged

scale. Item a is the vulcanizing cylinder with the helical groove a^2 into which the conical belt b to be vulcanized is inserted. The conical belt b and the metal band c are jointly fastened to the cylinder at both ends by screw bolts f . Pressure rollers e force the conical belt surmounted by the metal band deep enough into the helical groove a^2 until the flanges of the pressure rollers e come in contact with the straight-line guiding tracks a^1 of the helical groove a^2 , whereby the thickness and width of the conical belt are exactly determined.

The high pressure upon the conical belt required for vulcanizing is exerted during the vulcanizing process, according to the present invention, by utilizing the difference of the coefficient of thermal expansion of the materials used for the vulcanizing cylinder and the metal band. For this purpose the vulcanizing cylinder is made of a material with a very high coefficient of thermal expansion, for example, aluminium, whilst the metal band surrounding the belt is made of a material with a very low coefficient of thermal expansion, for example, steel.

Aluminium and caoutchouc have a very great heat expansion when subjected to the vulcanizing heat of about 140° , whilst the steel band behaves almost indifferent at this temperature and shows only negligible signs of expansion. Through the expanding tendency of the enclosed caoutchouc and through the expansion both in length and diameter of the aluminium cylinder during the vulcanizing process, a high pressure is exerted automatically below the steel band which is fastened at both ends to the cylinder. This pressure is evenly distributed upon the whole length of the worm or helical groove so that a product of highest uniformity and compactness is obtained, having the desired curvature.

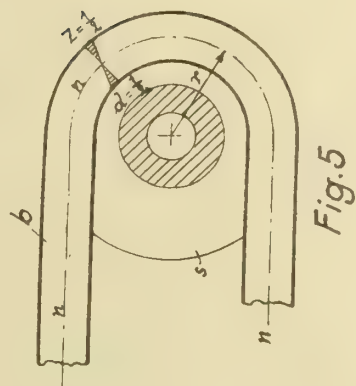
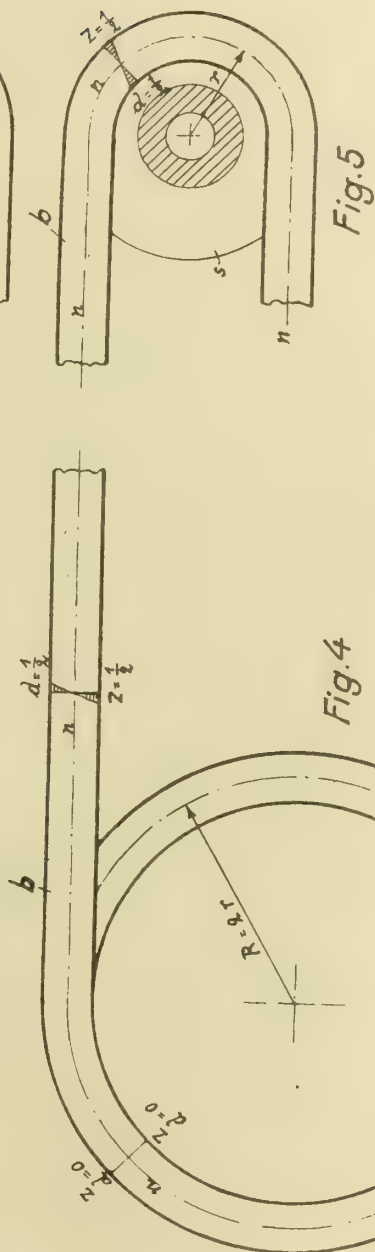
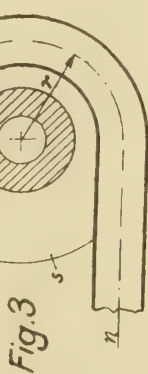
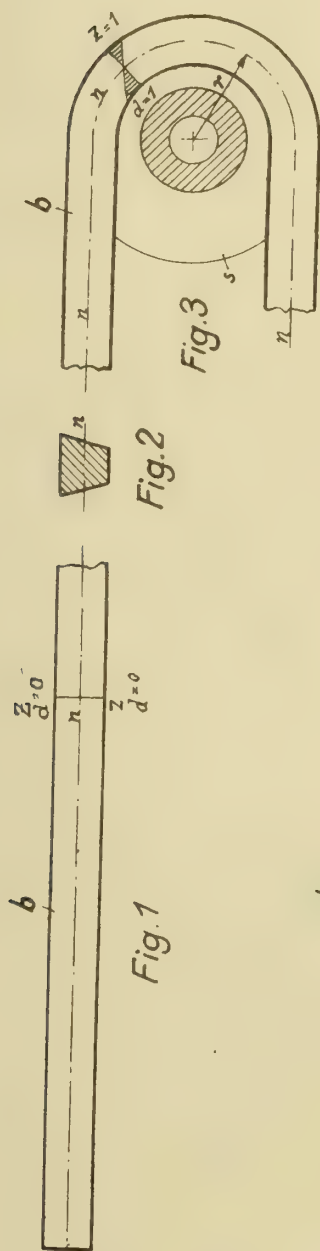
The method and apparatus of the present invention have been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described and illustrated in the drawing.

JOHANN MEYER.

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BY A. P. C.

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CONICAL BELTS
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3 Sheets-Sheet 1



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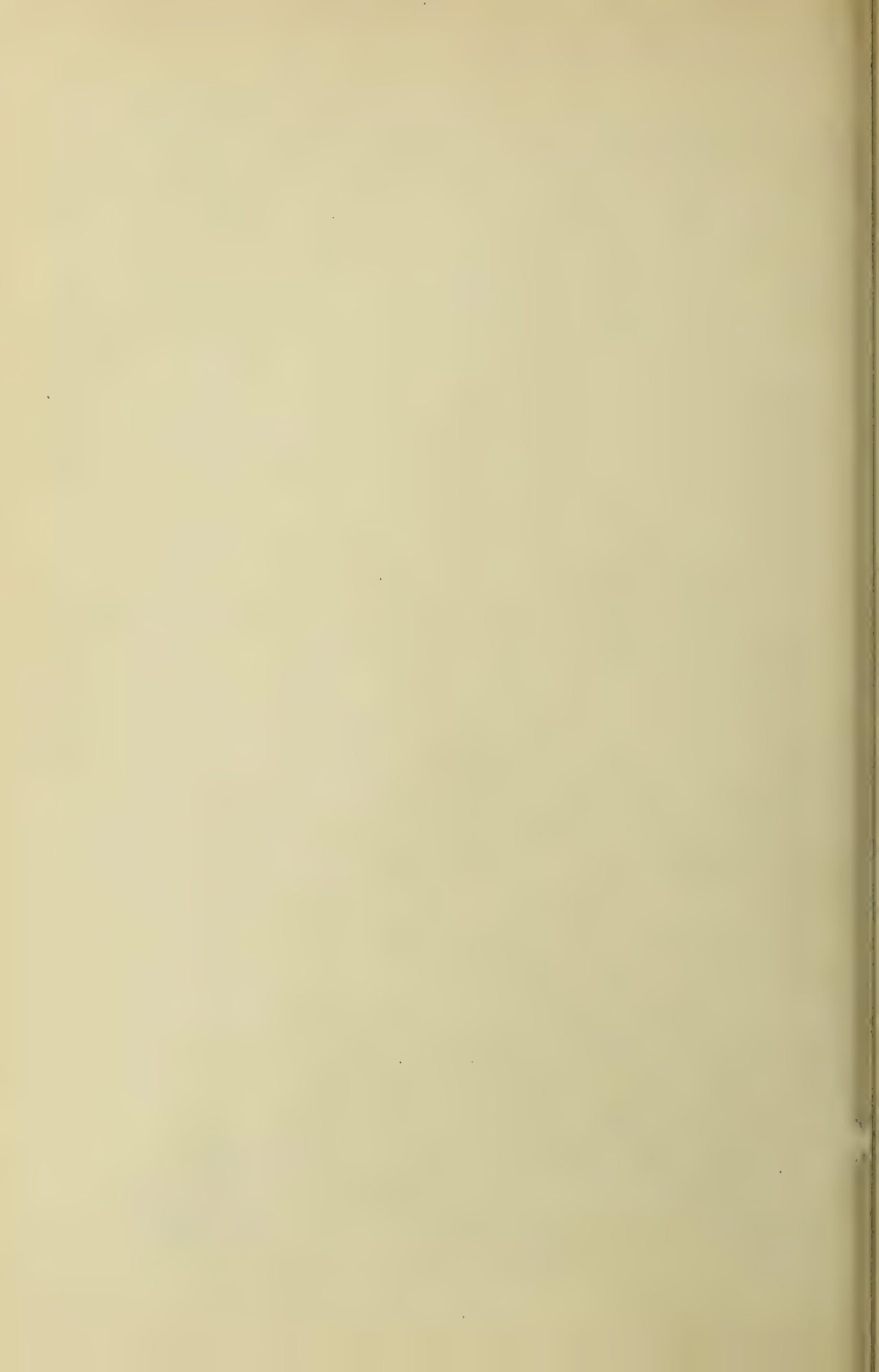


Fig. 6

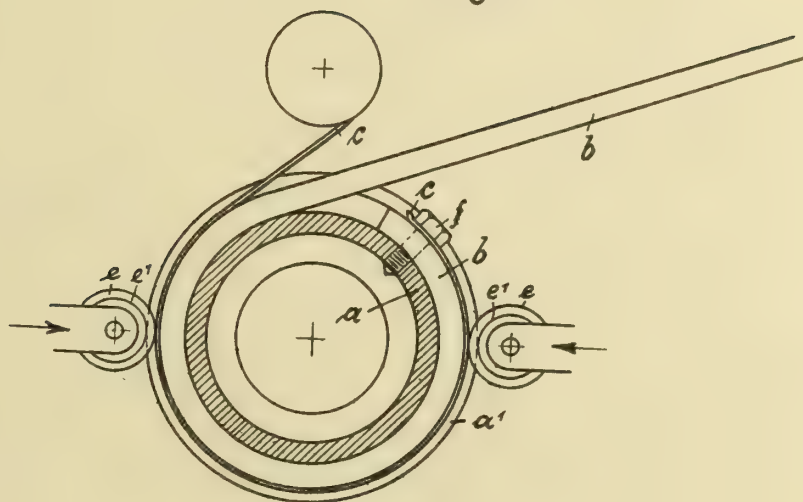
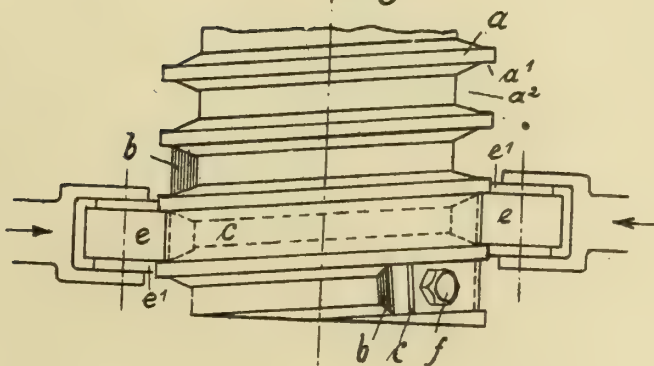


Fig. 8



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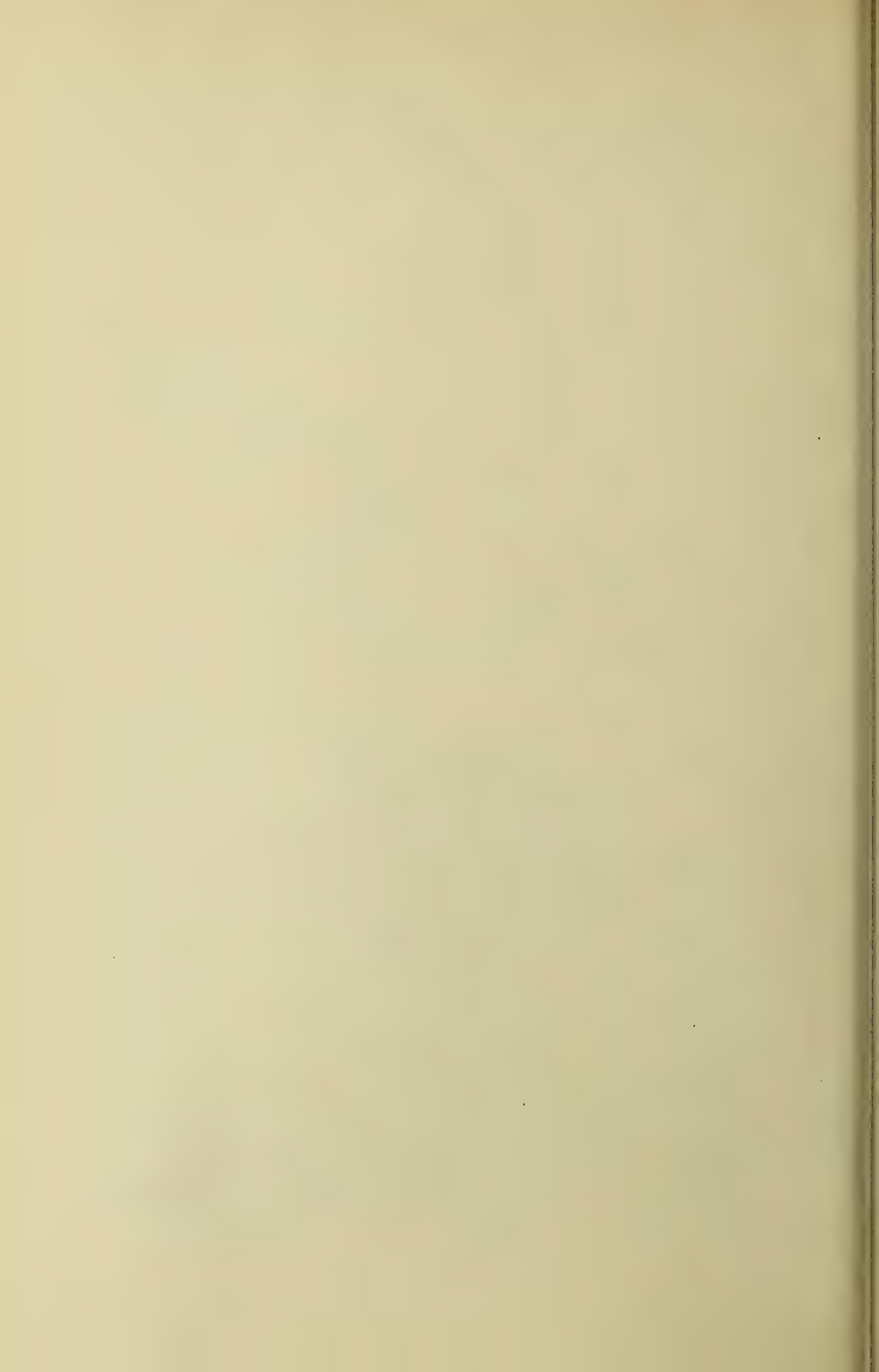


Fig. 7.

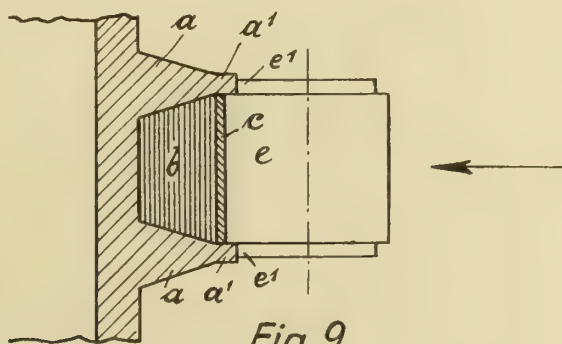
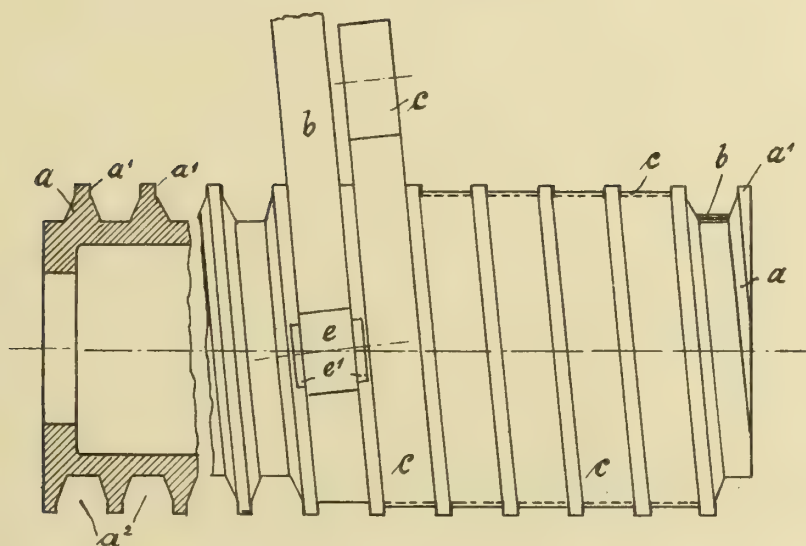


Fig. 9

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ALIEN PROPERTY CUSTODIAN

PROCESS AND MEANS FOR LOWERING A CONSTRUCTION WITH A COMPARATIVELY LARGE BASE INTO THE SOIL

Bernardus Hermanus Henricus Zweers, Naarden, Netherlands; vested in the Alien Property Custodian

Application filed July 31, 1940

The invention relates to the lowering into soil up to the required depth of foundational constructions that have been previously constructed in their entirety or in part—as for example the section of a tunnel, a quay foundation, or any foundational construction in general with a comparatively large basic surface—by means of washing away the supporting soil.

The lowering of piles and sheet pilings according to the jetting method whereby by means of a supporting jet the resistance of the soil is so diminished that the pile or sheet can be introduced into the soil through its own weight or by loading, for example with the help of a drop hammer—is well known and in general use.

The invention, however, relates to the lowering of a foundational construction with a comparatively large basic surface into the soil up to the required depth, and is particularly effective when an even distribution of pressure over the underlying soil is of major importance.

The soil may be excavated, for example to within 1 M of the required depth and is as far as possible flattened. Then the foundational construction is placed and lowered into position, or is wholly or partly constructed on the spot. Thereafter a liquid is led under the construction in supply pipes that have been previously provided. If this is properly done, the sand will be washed away allowing the construction to sink.

Such a method, however, required special provisions. Since irregularities in the previously flattened soil cannot always be avoided, especially when the flattening has to be done under water, and moreover since soil is not, as a rule, homogeneous, an unequally distributed pressure is usually inevitable, causing very great extra strain to the foundation, as for instance in the case of a very long tunnel section. Besides, if the liquid were then to be supplied, there would be the difficulty that the water would flow along quite irregular paths of the least resistance which cannot be ascertained beforehand, so that the soil would not be washed away evenly over the whole surface. Consequently, the right position and an even pressure for the construction on the soil would not be obtained.

Therefore, according to the invention ribs, preferably with a triangular cross section, are fixed to the base of the construction. When a foundational construction provided with such ribs is lowered on to soil that has been previously flattened or dredged, these ribs penetrate the soil to a certain depth. Hereby the immediate advantage is gained, namely that the pressure of

the construction is much more evenly distributed over the underlying soil surface; eventual irregularities in the soil now exercise far less influence on the distribution of pressure, so that there is less likelihood of extra strain in the construction.

When the ribs do not completely penetrate into the soil,—which is entirely a matter of adjusting the form and the distances between each rib to the weight of the construction and the substance of the soil,—channels are formed by the ribs and the surface of the soil. If liquid is now led under the foundation it will find an outlet in these channels. When the velocity of the liquid is sufficiently high, soil will be carried away by it. Such displacement of the topmost layer of soil between the penetrating ribs causes an increase in the pressure per surface unit of soil; equilibrium is consequently disturbed, and the construction sinks until a new equilibrium has been obtained. This process generally takes place continuously, and is carried on until the required depth has been reached.

Since, the ribs, and consequently also the channels limited by them are regularly distributed over the whole of the base of the construction, and since the liquid generally flows through all the channels simultaneously, uniform penetration and almost the same soil pressure is obtained all over.

Moreover, to ensure that pressure is evenly distributed along the whole length of a rib, the removal of soil from the channel itself can be effected regularly. The further one gets from the beginning of the channel, the greater will be the velocity of the liquid required to transport the soil. This determines the width of the channels which can be ascertained by experiment. The necessary decrease in their widths may be obtained by filling them up at the top, increasing towards the direction in which the liquid flows. The velocity of the liquid therefore increases towards the ends.

It is also advisable to take steps to ensure that the stream of the liquid is properly directed into the channels, and that it is as free as possible from strong or mutually very different eddies, e. g. in each channel a number of stream directors may be placed parallel to the length of the channel.

By dividing the number of ribs into at least 3 groups to which the liquid can be supplied independently, the foundation can be lowered as desired; and even the stream of liquid for each channel can be regulated.

For the application of the above invention it is desirable to have fairly homogeneous soil which can be easily washed by the liquid. Less convenient soil may be replaced in advance by one that is more suitable, e.g., by sand.

To avoid subsequent sinking caused by further penetration of the ribs owing to great loads, the pressure on the soil during or immediately after the penetration of the ribs may be increased beyond the maximum that the building is expected to weigh on completion. In addition the channels as well as the spaces adjoining the sides of the foundation may be filled up, for instance with concrete.

The liquid can be led from an axial rib to both sides by means of channels. But this can also be done from one, or from two opposite sides of the foundational construction, whereby in the first case all channels end on one side, and in the second case alternatively on opposite sides.

If an axial rib is applied, by making the ribs on the one side opposite the channels on the other side of said axial rib, and by arranging that most of the liquid for the one channel is supplied from the opposite rib on the other side of the axial rib, the width of this axial rib may be decreased.

The invention also includes within its scope constructions which can be sunk into the soil according to this method and furthermore a separate supporting plate provided with ribs which may be substituted for the specially made lower portion of the construction, and on which therefore the construction can be placed.

In the accompanying drawing two applications of the invention are illustrated, namely with, and without the separate supporting plate.

Fig. 1 shows a cross section of a concrete block with two adjoining tunnel traffic roads;

Fig. 2 shows part of the vertical section along the line II—II of Fig. 1;

Fig. 3 shows part of the horizontal section along the line III—III of Fig. 1.

As the bottom of the tunnel in the drawing there is a lengthwise axial rib 2 of which the cross section is a triangle with its base uppermost, from which axial rib ribs 3 with the same cross section extend to both sides, forming channels between them.

Through a filling 5 on the upper side (Fig. 2) which increases towards the ends of the channel, the width of the channel decreases towards its ends. Experiments have shown that thereby the soil 6, which owing to the weight of the construction 1 partly presses into channels 4 and thus closes them underneath, is carried away very evenly.

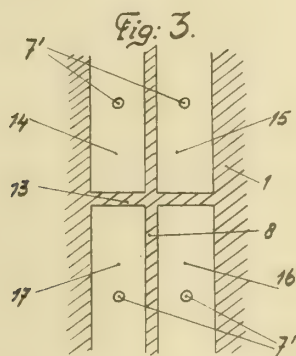
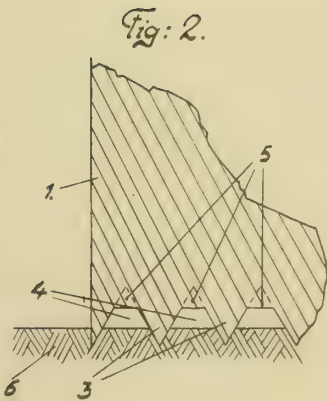
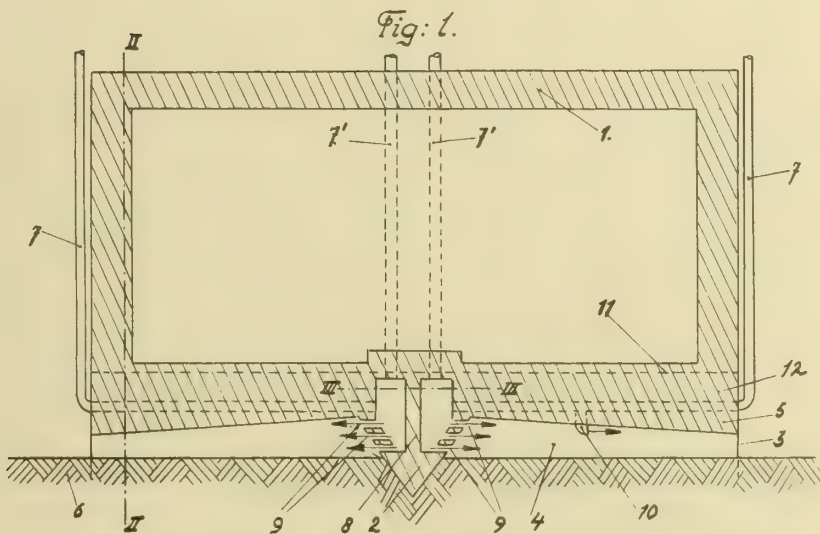
From the axial rib 2 by means of a partition 8 and stream directors 9 the liquid supplied by tubes 7 is made to flow outwards to both sides through the channels 4 as indicated by the arrows. An additional supply nozzle is shown by 10.

The part of the body located underneath the line 11 (Fig. 1) may be a separate supporting plate provided with ribs upon which the construction is placed, which in that case has a flat base; notches or the like which have not been indicated on the drawing may be provided to keep the construction in correct position on the supporting plate.

When the specially constructed lower portion 12 forms part of the construction 1, the tubes 7 may be arranged in the middle as indicated by 7'.

According to Fig. 3 there is a cross partition 13 dividing the channels into four groups 14, 15, 16 and 17. If e.g. the rear or the right side of the construction should sink too far, less or no liquid at all is supplied to the groups 14—15 and 15—16 respectively.

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ALIEN PROPERTY CUSTODIAN

PROCESSES FOR THE MANUFACTURE OF
ARTIFICIAL TEXTILE FIBRES

Antonio Ferretti, Milan, Italy; vested in the Alien
Property Custodian

No Drawing. Application filed July 31, 1940

This invention concerns improvements in or relating to processes for the manufacture of artificial textile fibres.

In co-pending U. S. Patent Application Serial N. 96470 of 1936, processes are described and claimed by which a casein and a colloidal solution thereof may be produced from milk and by which the colloidal solution can be spun and coagulated in a manner which is suitable for use in the manufacture of artificial textile fibres. Coagulated fibres produced by these processes must be rendered insoluble and the present invention provides in a process for the manufacture of artificial textile fibres the step of rendering casein fibres insoluble by subjecting them to treatment in a solution of which formaldehyde forms the basic substance together with sodium chloride.

It is to be understood that, as described in the co-pending Patent Application, the term "casein fibres" refers to fibres made from casein solution alone or of a mixture thereof with cellulosic viscose.

It is known that casein is hardened by formaldehyde but the coagulated fibres contain a considerable percentage of water and other impurities which when immersed in solution of formaldehyde would cause the fibres to swell so that the fibres would partially dissolve before the formaldehyde could have rendered them insoluble. For this reason it has not been possible to obtain pliable and successful artificial textile fibres by known means. According to the present invention, however, the coagulated fibres are hardened in an aqueous solution of which formaldehyde forms the basic substance together with the addition of sodium chloride, which prevents further swelling of the fibres.

The fibres may be treated with solutions, of which formaldehyde forms the basic substance, with the addition of sodium chloride, and also aluminium salts, or an acid.

An aqueous solution of sodium chloride of less

than 10% exercises a swelling action on the casein fibres whilst a solution with more than 10% exercises an astringent action. It is therefore very useful to regulate the behaviour of the fibres in the bath which renders them insoluble by employing a convenient quantity of sodium chloride.

It is possible to operate with a solution having but one concentration only, for instance, with 90 parts of a 12% aqueous solution of sodium chloride and 10 parts of 40% formaldehyde, to which aluminium salts may be added or not. Examples of suitable aluminium salts are potassium alum, aluminium chloride and aluminium sulphate. It is preferable, however, and even very important, to operate with various solutions having progressively increasing concentrations, and to begin the treatment of the filaments with weak concentrations, for instance with 99 parts of 12% aqueous solution of sodium chloride and 1 part of 40% formaldehyde, gradually passing to higher concentrations. The procedure is the same when aluminium salts are added, but it is preferable not to reduce the sodium chloride concentration below 10% in order to avoid an excessive and undesirable swelling of the fibres.

The solution for rendering the filaments insoluble which are prepared in the manner described above may be slightly acidified, preferably with sulphuric acid.

According to a preferred embodiment of the present invention the fibres are rendered partially insoluble and are maintained under tension in an initial low concentration bath, in order to prevent shrinkage thereof, and subjected to further treatment in baths of higher concentration after being cut to a desired length in order to obtain a twisting thereof.

The fibres may also be rendered insoluble by treatment in an initial low concentration bath and by subsequent treatment in a series of baths of gradually increasing concentration.

ANTONIO FERRETTI.

ALIEN PROPERTY CUSTODIAN

PROCESSES FOR THE MANUFACTURE OF ARTIFICIAL TEXTILE FIBRES

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No Drawing. Application filed July 31, 1940

This invention concerns improvements in or relating to processes for the manufacture of artificial textile fabrics.

A process is described in co-pending U. S. Patent application Serial N. 96,470 of 1936, by which casein may be produced which is suitable for use in the manufacture of artificial textile fibres. Casein, however delivered, is soluble in all alkalies giving viscous colloidal solutions. The present invention provides in a process for the manufacture of artificial textile fibres the selection of sodium hydrate and/or potassium hydrate as solvents for casein in the production of a colloidal solution thereof. Hitherto the weaker alkalies such as sodium borate, sodium carbonate and ammonium hydrate have been employed for this purpose because they do not affect the casein. According to the present invention, however, sodium hydrate and/or potassium hydrate are selected from all known alkalies for the production of a colloidal solution of casein although they have hitherto been avoided because they attack casein more than any other alkalies. All other alkaline agents, even if combined together in the most varied proportions, produce colloidal solutions of casein which cannot be spun. This fact, which has been ascertained as the result of numerous experiments, applies not only to the textile casein produced by the process described and claimed in the specification of the patent application referred to above, but to all trade caseins whether lactic or acid. Thus despite the disadvantages normally associated with sodium hydrate and potassium hydrate, only these two alkaline agents can be employed, according to the present invention, for the production of a colloidal solution of casein suitable for use in the manufacture of artificial textile fibres.

In practice it is preferable to employ sodium hydrate because it is cheaper than potassium hydrate while the results are identical. A mixture of sodium hydrate and potassium hydrate can also be used. Also, small quantities of other alkaline agents may be added to the solution in order to modify slightly the properties of the colloidal solution. It is necessary, however, to confine these additions within narrow limits, because otherwise the colloidal solution of casein would lose its spinning properties. In other words, it is essential that the alkaline agent employed for the colloidal solution of casein should preponderately consist of sodium hydrate or of potassium hydrate or of a mixture thereof.

In the preparation of the solution casein and alkali are employed in the equivalent ratio of 23

litres of 35° Bé sodium hydrate to 100 kilogrammes of dry unwashed casein containing a normal quantity of moisture, with a tolerance on the quantity of alkali employed of 20% above or below the indicated value.

The amount of sodium hydrate preferably to be employed in order to obtain a colloidal solution of casein suitable for the manufacture of textile fibres has been calculated upon the assumption that a temperature of 24° C. is employed for the solution of the casein and for its subsequent maturing. However, the amount of sodium hydrate may be slightly reduced if the adopted temperature is higher than the temperature indicated above, and conversely the amount may be slightly increased for a lower temperature. No true reverse proportion, however, exists between the quantity of alkali and the temperature adopted, because the quantity of alkali generally influences the solubility of the casein, whereas the temperature generally influences the viscosity, volume and maturing of the colloidal solution.

If the amount of sodium hydrate employed remains unaltered an increase in temperature results in a greater volume and viscosity and more rapid saturation of the colloidal solution.

It is not advisable however to depart considerably from the mean temperature of 24° C. For instance, if the temperature of 35° C. is progressively exceeded, the volume progressively becomes excessive and the viscosity unduly great as compared with the viscosity necessary for spinning and, above all, the risk of seriously endangering the quality of the ultimate product is incurred. Conversely, with a temperature below 14° C., an unduly large and useless delay occurs in the maturing and it is difficult, if not impossible, to realize the desired volume of colloidal solution.

It is possible to increase the viscosity of the colloidal solution of casein without altering its spinning property (and even improving the same) by employing special diluting agents hereinafter specified. These diluting agents, however, always have the same effect upon the viscosity and the volume of the colloidal solutions whatever may have been the preparation and maturing temperatures, so that the differences of the colloidal solutions of the textile casein in viscosity and volume remain practically unaltered relatively to one another at the different temperatures.

Various examples of colloidal solutions of tex-

tile casein will be given in order that the present invention may be clearly understood.

Example A

When a dried casein that has not been washed after coagulation is employed:

A predetermined quantity of dried and ground casein is placed in a suitable vessel fitted with a stirring device and with a double bottom and double walls for the circulation of the water necessary to regulate the temperatures during the dissolving, diluting and maturing of the colloidal solution of casein.

For each 100 kilos of dried casein containing a normal moisture percentage of 10%, 200 litres of water previously heated to a temperature of 24°C. are poured into the vessel, and uniformly distributed throughout the casein which has been previously placed in the vessel. However, it is also practicable to pour the water into the vessel before the casein has been introduced.

After the water and casein have been mixed for two or three hours there is introduced into the vessel a solution comprising 23 (twenty three) litres of 35° Bé. sodium hydrate and 77 (seventy seven) litres of water, previously heated to a temperature of 24° C. for each 100 kilos of dried casein referred to above. The solution is energetically stirred in order rapidly and uniformly to incorporate the sodium hydrate with the casein solution. When the mixture has become uniform the stirring may be slowed down or be effected only at intervals. The temperature is preferably maintained constant at 24° C. It may be mentioned that instead of employing prepared 35° Bé. sodium hydrate, a corresponding quantity of dry sodium hydrate may be dissolved in water. Likewise, the procedure is the same if instead of sodium hydrate, potassium hydrate is employed, bearing in mind that, the temperature of 24° C. remaining unaltered, the quantity used must correspond to the alkalinity or neutralising power of 23 litres 35° Be. sodium hydrate for each 100 kilos of dry casein containing 10% moisture. If the moisture percentage in the casein employed is higher or lower, the amount of water and alkali to be added to the casein must be varied accordingly.

When the casein has been dissolved and the mass has gradually become more viscous (this being effected in a few hours depending upon the type of casein employed, namely, whether it has been coagulated with a greater or smaller quantity of acid, and a temperature of 24° C. has remained unaltered), a slow and gradual dilution is effected so as to compensate for the increasing viscosity of the colloidal solution whilst it matures.

The diluting agents hereinafter specified and previously heated to a temperature of 24° C. are preferably added little by little in order to avoid momentarily an unduly great dilution which would delay the regular and gradual development of the viscosity necessary to permit the subsequent additions of diluting agents until the desired volume of the colloidal solution is obtained and without causing this solution to lose its spinning property.

When the desired volume and viscosity of the colloidal solution have been obtained, the increase in the viscosity can be stopped by slightly lowering the temperature of the solution, the solution thus remaining stabilised for a certain time so that it can be transferred to the spinning machines with the properties and charac-

teristics previously established. This is of the greatest importance for regular spinning which otherwise would be difficult to obtain.

The time necessary for accomplishment of the above features, that is the time required for the dissolving, the maturing and the increasing of volume of the colloidal solution of casein may vary within wide limits, because the said time does not depend solely upon the desired volume and viscosity but also upon the types of the caseins, and diluting agents that are employed and upon the temperature employed during the alkaline dissolving and maturing of the casein.

A casein obtained from 250 cubic centimetres of 66° Bé sulphuric acid for each 100 litres of skimmed milk by the methods described above, dissolved in the manner indicated at a constant temperature of 24° C, and diluted with ordinary water, generally takes 48 hours to mature in order to reach a viscosity suitable for spinning and a volume of 550-600 litres for each 100 kilos dry casein used. When a smaller volume is desired, all other factors remaining unaltered, the time for maturing may be reduced somewhat. When a greater volume is desired, the time for maturing may be increased but only up to a certain limit because it has been found that after 96 hours, for instance, it is possible detrimentally to effect the quality of the textile fibres obtained.

Also the quantity of acid employed for coagulation of the casein, and to a slight extent also the types of acid employed, play an important part in determining the viscosity and volume of the alkaline solution of casein. The greater the amount of the acid employed for coagulating casein, the viscosity and volume of the subsequent alkaline colloidal solution are lower and are obtained less rapidly. Conversely, the smaller the quantity of acid employed so the viscosity and volume of the solution are higher and are obtained more rapidly. By an excessive variation of the quantity of acid in the one or in the other direction, solutions can be obtained which are difficult to spin, apart from the lower quality of the resulting fibres.

Accordingly, when caseins having the different properties indicated above are employed, it is preferable and—in the extreme cases mentioned essential—to modify the initial volume of casein solution.

In the example indicated above the initial volume after the addition of the sodium hydrate solution is 400 litres for each 100 kilos of casein employed. This volume may be slightly increased or reduced, but only between narrow limits because by increasing the volume by a greater addition of water, while the other factors remain unaltered, the complete dissolving of the casein and the development of the viscosity requisite for proceeding to the successive additions of diluting agent are delayed. If an excessive initial volume of casein solutions is employed, the regular development of the process may be irreparably spoiled. On the other hand, a reduction of the initial volume of casein solution renders an intimate mixture of the alkali and the casein, and consequently a perfect solution, more difficult and impossible, if the initial volume of casein solution is very small.

The volume referred to above is suitable for the type of casein indicated. For caseins that have been coagulated with a greater quantity of acid it is advisable to reduce slightly the volume of the initial solution, and conversely to increase

the same for caseins that have been coagulated with a smaller quantity of acid.

The casein that has been washed prior to drying is dissolved in the same manner as that which has not been washed, with the difference that the quantity of alkali employed is reduced according to the lesser quantity of acid left in the casein in consequence of washing.

Example B

The dissolving of casein which has not been dried, that is to say, casein which still contains a percentage of acid serum, is carried into effect with the following modifications.

The casein, coagulated and heated in its serum as indicated above and previously deprived of its excess moisture, is pressed so as to reduce its serum content, preferably to less than 200% of the weight of the dry casein, this being effected in order to facilitate the subsequent grinding of the pressed casein.

The casein is placed in a vessel constructed as previously described, without addition of water which in this case is replaced by the serum left in the casein. The 35° Be. sodium hydrate solution is then added, this solution having been previously diluted with the quantity of water nec-

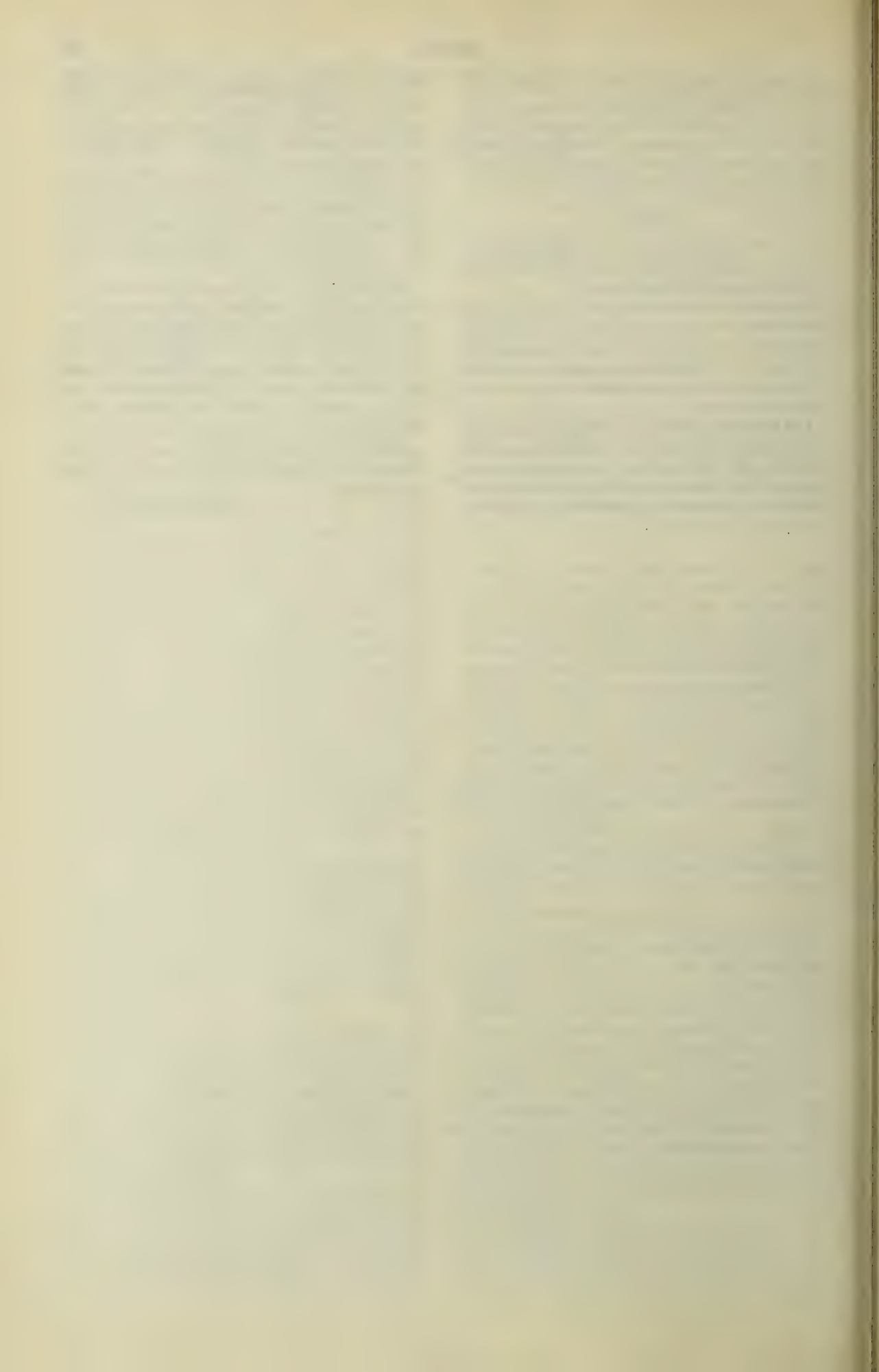
essary to produce, as indicated in the preceding example, a volume of 400 litres for each 100 kilos of casein, always referred to the dry weight of casein including the normal moisture content of 10%, the procedure thereafter is the same as that indicated in Example A.

In order to increase the volume of the solution while maintaining the viscosity constant the solution is diluted during the maturing action, for example by means of the milk serum obtained after the coagulation of the casein or by a solution of sodium lactate, or sodium formate or sodium bisulphite or soap.

Substances of the type of sulphides and xanthogenates which accelerate the subsequent coagulating properties of the casein may be added to the alkaline solution. A suitable accelerating agent is carbon sulphide or sodium sulphide, or sodium sulphohydrate. Soaps, glycerine and the like, previously treated with carbon sulphide and sodium hydrate, or cellulose xanthogenate can be employed.

The colloidal solution of casein obtained by the process according to the present invention is suitable for spinning in the manufacture of artificial textile fibres.

ANTONIO FERRETTI.



ALIEN PROPERTY CUSTODIAN

PROCESSES FOR THE MANUFACTURE OF ARTIFICIAL TEXTILE FIBRES

Antonio Ferretti, Milan, Italy; vested in the
Alien Property Custodian

No Drawing. Application filed July 31, 1940

This invention concerns improvements in or relating to processes for the manufacture of artificial textile fibres.

In co-pending U. S. Patent Application Serial N. 96470 of 1936, processes are described and claimed by which a casein and a colloidal solution thereof may be produced which are suitable for use in the manufacture of artificial textile fabrics. The present invention concerns the treatment of such casein for spinning.

According to the present invention there is provided in a process for the manufacture of artificial textile fibres, the step of passing an alkaline solution of casein derived from milk through a spinning nozzle and coagulating the fibres obtained thereby in an aqueous solution of an acid and at least one other substance which renders the coagulated fibres insoluble. The process may be effected with the addition of aluminium salts and/or tin salts and/or formaldehyde with or without sodium salts to the acid coagulating bath.

Example of coagulating baths which may be employed are as follows:

Example A

An aqueous solution of sulphuric acid and sodium sulphate is made, the proportions being such that the bath contains 140 cubic centimetres of 66° Bé sulphuric acid and 400 grammes of sodium sulphate for each litre of the bath. To this solution, aluminium salts are added, preferably aluminium sulphate or potassium alum. It is also advantageous to add small quantities of tin salts, for example tin acetate.

Example B

An aqueous solution of sulphuric acid, alumin-

ium sulphate (or potassium alum) and sodium chloride is made, the proportions being such that the bath contains, for each litre thereof, 150 cubic centimetres of 66° Bé sulphuric acid, 150-200 grammes of aluminium sulphate and 75 grammes of sodium chloride. The quantity and proportion of aluminium sulphate and sodium chloride may be varied according to the effects required, bearing in mind that the function of the aluminium salts is to harden rapidly the filaments as soon as they have been coagulated, and that the presence of the sodium chloride in the bath assists the action of the aluminium salts in making filaments insoluble. In preparing this solution, care should be taken not to heat it unduly, so as to avoid the transformation of a portion of the sulphuric acid into hydrochloric acid. There may likewise be added to this solution small quantities, up to 10% of the solution by weight, of other salts, such as for example, magnesium sulphate, zinc sulphate, ammonium sulphate or the like in order to increase the efficiency of the coagulation.

When the colloidal solution of casein contains carbon sulphide, it is preferable to employ the first bath indicated above as the coagulating agent.

For the mixed solutions of casein and viscose, the first bath is likewise preferable and the amount of sulphuric acid employed can be gradually reduced to 55% of the amount indicated above according to the higher or lower percentage of viscose added to the casein solution. The higher the percentage of viscose, the lower can be the amount of acid in the coagulating bath. Also, the bath temperature may be slightly lower.

ANTONIO FERRETTI.

ARTICLE

THE
JOURNAL OF THE
AMERICAN MEDICAL ASSOCIATION

The Journal of the American Medical Association is published weekly, except during the summer months, when it is published bi-weekly. It is the official journal of the American Medical Association, and is the only journal of the profession that is published by a national organization. The Journal is published for the benefit of the medical profession and the public, and is a valuable source of information on the latest developments in medicine and surgery. It contains original articles, reviews, and news items of interest to the medical profession. The Journal is published in English and is available to all members of the American Medical Association. It is also available to libraries and other institutions. The Journal is published by the American Medical Association, 535 North Dearborn Street, Chicago, Illinois. The subscription price is \$5.00 per annum in advance. Single copies are available for purchase at a special rate. The Journal is published by the American Medical Association, 535 North Dearborn Street, Chicago, Illinois. The subscription price is \$5.00 per annum in advance. Single copies are available for purchase at a special rate.

The Journal of the American Medical Association is published weekly, except during the summer months, when it is published bi-weekly. It is the official journal of the American Medical Association, and is the only journal of the profession that is published by a national organization. The Journal is published for the benefit of the medical profession and the public, and is a valuable source of information on the latest developments in medicine and surgery. It contains original articles, reviews, and news items of interest to the medical profession. The Journal is published in English and is available to all members of the American Medical Association. It is also available to libraries and other institutions. The Journal is published by the American Medical Association, 535 North Dearborn Street, Chicago, Illinois. The subscription price is \$5.00 per annum in advance. Single copies are available for purchase at a special rate.

ALIEN PROPERTY CUSTODIAN

SPINNING METHOD

Gerhard Aschenbrenner, Babelsberg, near Berlin,
and Bernhard Wempe, Berlin-Schlachtensee,
Germany; vested in the Alien Property Custodian

Application filed August 1, 1940

The present invention relates to a spinning method for producing spinning fibres.

In the production of artificial spinning fibres by pressing liquids of any kind through nozzles, whereby substances either genuinely or colloidal-ly solved in liquids or molten substances are formed to spinning fibres, the result of the finished product is amongst other factors essentially dependent on the properties of the spinning nozzles. The most various materials are used in practice to make such nozzles. Alloys of noble or precious metals, such as gold, platinum, rhodium, have been proposed for this purpose. Tantalum and other metallic substances have also been proposed for this purpose. The heat treatment of such alloys results in a high degree of hardness and therefore a long life of nozzles made of such alloys, a sufficient expansion or dilatation and elasticity respectively being ensured simultaneously.

Nozzles made of ceramic materials, particularly of glass, have originally been used in the production of fibres obtained from macromolecular solutions. Such nozzles practically are not used today if viscose is employed as spinning liquid, because nozzles of this kind proved to be too brittle. As nozzles of considerable hardness and capable of resisting acids and the like, the use of nozzles made of steatite has also been proposed which is drilled and subsequently hardened by annealing. It has not become known whether such nozzles have proved to be of value in practice. Anyhow nozzles of this kind are not used, because nearly exclusively nozzles made of noble or precious metal are employed to-day in practice in spite of the high costs of such nozzles.

Now, it has been found that nozzles made of metallic materials, primarily of so-called alloys of precious metal highly developed in the artificial silk industry, are not adapted to be used in connection with strongly glutinous spinning solutions, particularly such of macromolecular substances whether in solutions, hydrosols or organosols.

Generally all spinning nozzles built up on a metal basis fail, if melting of macromolecular substances obtained by polymerisation or polycondensation are to be spun. Since such spinning solutions, for instance spinning solutions obtained by dissolving casein and other protein substances in their solvents, spinning solutions obtained on the basis of hydrocarbons, polymerisates or condensates, phenol- or cresol-formaldehyde-rosins (phenoplastes) aniline rosins, phenol-furfural rosins, i. e. solutions or meltings of artificial sub-

stances on the basis of phenols and their derivatives, artificial substances on the basis of carbamides, artificial substances on the basis of carbocyclic acid, such as are obtained by polymerisation thereof, as phthalic rosins, maleic acid esters, succinic acid esters, polymerisates of ethylene derivatives, as monomers and polymers of styrols, isobutylene, vinyl esters, vinyl ethers, vinyl methyl ketones, acrylic acid- and methacrylic acid-compounds, but also polymerisates and derivatives of butadiene, isoprene and other macromolecular substances, compounds of isoprene acid and other acids which at present are used in the artificial silk industry as basis of artificial substances, are employed in practice today to a large extent, it has proved that nozzles made of precious metal used in the artificial silk industry, particularly in connection with viscose or cupric oxide ammoniac cellulose, practically cannot be successfully employed. Greatest difficulties arise particularly during spinning on. The perforations of the nozzles are closed by overgrowing and are covered. As a further result, the spun thread may only be drawn off with very low speed so that stretching practically is impossible. Moreover, substantial titre fluctuations occur when using metallic nozzles particularly when employing same for spinning meltings.

Now, it has been found that all these disadvantages are obviated by the use of nozzles of vitreous materials, such as glass and quartz glass, and that with such nozzles the spinning speed may very considerably be increased. It has been shown that glass is very slightly moistened only by such strongly glutinous substances, so that the spun thread may quickly be withdrawn and simultaneously easily be spun on. The force required for drawing off may be so chosen that practically the limit of the strength of the spun thread is reached.

Particularly when using meltings, nozzles of low heat conductivity must be used, because the artificial substances to be spun as meltings very often have a very low range of temperature in which they may be spun, i. e. in which they pass from the solid state by way of the viscous state to the diluted state capable of being spun. If the temperature is not high enough such spinning solutions are too viscous to be spun at all, and if the temperature is raised a little higher only the danger exists that hereby disintegrations are caused.

This is very peculiar and cannot easily be explained. It may be imagined that the surface tension of the strongly glutinous substances in

consideration, i. e. of the protein solutions, the solutions or meltings of the above mentioned preferably thermoplastic condensates and polymerisates, due to their low viscosity relatively to other spinning solutions, just with regard to vitreous substances is so favorable that the otherwise rather injurious brittleness of the glass is not harmful and just owing to the favorable proportion of the surface tension of the spinning liquids in consideration to glass or quartz allows a smooth separation without cloggings occurring.

The invention, therefore, relates to a method of spinning strongly glutinous spinning liquids, as solutions or meltings of thermoplastic and meltable macromolecular condensates or polymerisates, spinning solutions on the basis of protein substances, as preferably casein or protein of fish. For carrying out the new method it is further of importance that the drawing off speed may be greater than corresponds to the amount fed by the spinning pump, whereby the force used for drawing off may nearly reach the limit of the strength of the thread, and that the spinning is effected by means of nozzles of vitreous material, as glass or quartz glass. It is of no importance, whether solutions or meltings are spun and whether the spinning is effected in a liquid or in a gas.

By using nozzles made of the above mentioned materials in connection with the spinning solutions in question, spinning nozzles may be employed in which the individual spinning holes are spaced apart for a distance of 3 to 5 times as large as the diameter of the holes. In contradistinction thereto considerably larger spacings of the holes must be provided if a trial is made to spin glutinous liquids by the use of metal nozzles.

The heat and electric-conductivity of the material used according to the present invention probably is the reason for the fact, that electric tensions do not occur which are encountered, when the liquids in consideration are spun by means of metal nozzles. It was not to be foreseen that a strongly glutinous liquid, as for instance a spinning solution on the basis of alkaline protein substances or solutions of vinyl derivatives and the meltings thereof respectively could be spun by means of the rather brittle

glass nozzles. It was to be assumed that clogging and bursting respectively of the nozzles would occur at once, owing to the large sticking capacity which for instance in the case of vinyl derivatives is used for the manufacture of compound bodies of glass. It is, however, rather strange, that this clogging or bursting does not occur. It is, however, true that metal nozzles are clogged, whereas nozzles of glass remain clear and even allow operation with increased spinning speed.

In the accompanying drawing a nozzle adapted for carrying out the spinning method according to the invention is shown by way of example.

In this drawing:

Fig. 1 is a vertical section through a nozzle according to the invention,

Fig. 2 shows a plan view of the nozzle illustrated in Fig. 1 and

Fig. 3 is a section on line III—III of Fig. 1 on a larger scale.

The body 1 of the spinning nozzle consisting of a vitreous substance, for instance glass, quartz glass or the like, has a flange 2 and four cylindrical openings 3, 4, 5 and 6 the lower ends of the boundary walls of which are inclined towards the centre of the corresponding hole. In these holes the perforated plates 7, 8, 9 and 10 respectively are inserted. In Fig. 3 showing this construction on a larger scale the conical wall 11 obtained by the peculiar formation of the holes 3, 4, 5, 6 is clearly illustrated which serves the purpose of holding the perforated plates 7, 8, 9 and 10 in the body 1 of the spinning nozzle.

As may be seen from the drawing the individual perforations or holes 12 in the plates 7, 8, 9 and 10 are separated from each other for a distance about three to five times as large as the diameter of the holes 12.

Of course, the nozzle may be constructed in another manner without departing from the scope of the invention, as long as the nozzle is made of a vitreous material and the holes in the perforated plates are spaced apart a distance of three to five times the diameter of said holes.

GERHARD ASCHENBRENNER.
BERNHARD WEMPE.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

G. ASCHENBRENNER ET AL
SPINNING METHOD
Filed Aug. 1, 1940

Serial No.
349,256

Fig. 1

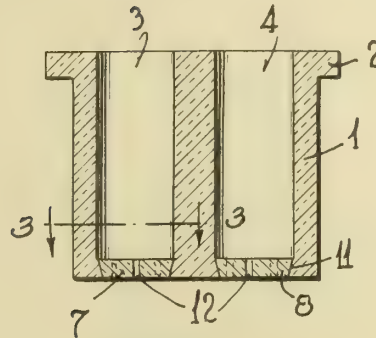


Fig. 2

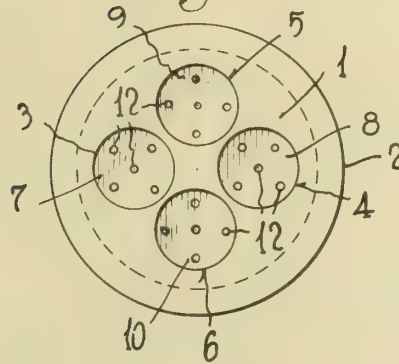
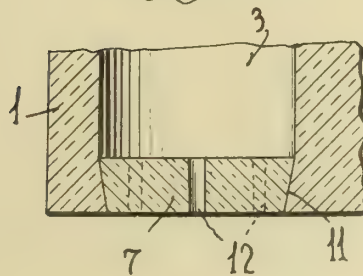


Fig. 3



Inventors
Gerhard Aschenbrenner and
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Attorney



ALIEN PROPERTY CUSTODIAN

METHOD AND APPARATUS FOR THE LOOSENING OF MATTED FIBROUS MA- TERIALS

Rudolf Kern, Siegburg, Germany; vested in the
Alien Property Custodian

Application filed August 5, 1940

This invention relates to improvements in method and apparatus for the loosening of matted fibrous materials and has for an object to provide such a method and apparatus which serves to loosen or fluff matted fibrous materials without subjecting the fibers to undue tearing, rubbing, or erosion.

In the manufacture of staple fiber the wringing of the material to partially free it of moisture causes the fibers to be matted together so that it is desirable to have the fibers loosened or fluffed before the material is transferred to the drying chamber. This is necessary in order to dry the material quickly and therefore secure the maximum effectiveness from the drying chamber. It is also necessary in order to permit uniform drying so that the moisture content of the material will be as nearly constant as possible throughout the mass. The latter is particularly important for commercial reasons.

It is an object of this invention to provide a method and apparatus whereby a web of more or less matted moist fibrous material is subjected to relatively high frequency vibrations particularly in a direction transverse to the web whereby the material will be shaken or beaten apart and loosening or fluffing thereof is effected without subjecting the material to a combing or other pulling treatment, which would cause injury to the fibers due to the fact that the wet strength of such fibers is generally relatively low.

It is another object to provide such a method and apparatus in which in addition to the beating action a current of air is applied to the web or mat to assist the loosening action.

A more specific object is to accomplish these results by passing the web of matted material over a cylinder revolving at high speed in the direction of movement of the mat, which cylinder is provided with vanes to impart vibrations to the web as the web passes thereover, which vanes are preferably so arranged that at least the ends thereof are tangential.

A further object is to provide the vanes of said cylinder with a plurality of knobs near the edges thereof whereby supplemental vibrations of a transverse wave-like nature are imparted to the web.

Another object is to so arrange said knobs that the knobs on successive vanes will strike the web at different points so as to impart further wave motion thereto and to assure that all parts of the web are properly beaten and loosened.

Other objects will become apparent from the following description taken in connection with the attached drawings showing illustrative embodiments of the invention and wherein:

Fig. 1 is a side view illustrating one form of apparatus for carrying out the invention;

Fig. 2 is a perspective view of the rotor;

Fig. 3 is an edge view of two adjacent vanes 5 showing the staggered relationship of the knobs;

Fig. 4 is a corresponding view of two adjacent vanes as viewed at right angles thereto.

Referring to said drawings, the numeral 1 designates a belt of foraminous material serving to convey a layer A of fibrous material. The belt 1 passes around roller 2 and 3 designates a pressing roller. The numeral 4 designates a roller carrying a series of vanes 5, say four in number, which vanes are shown as being tangentially arranged. Near the edge of the vanes 5 and on the effective side thereof are arranged a number of knobs 6 preferably of generally hemi-spherical form and as shown in the drawings preferably so arranged that the knobs of one vane are staggered with respect to the knobs of the next following vane.

7 and 8 designate rollers supporting and advancing a conveying belt 9 for transporting away the loosened or fluffed material A'.

The material A, due to previous treatment and/or to the squeezing or wringing action imparted thereto by roller 3, leaves said roller in a more or less compacted and matted condition, making drying thereof difficult. It thereupon passes above and over the roller 4 and vanes 5 which are rotating at a high speed, say two hundred fifty or more revolutions per minute. During this passage, the material A is given a large number of blows by the vanes 5 with the result that vigorous vibrations are imparted thereto, both in the direction transversely of the web and also longitudinally thereof. This causes the web to be loosened and fluffed without the application of substantial tearing action. Furthermore, if the knobs 6 are employed vibrations or waves in the direction of the breadth of the web are imparted thereto, serving to assist further in the loosening of the material. This action is increased if the knobs 6 of successive vanes are staggered with relation to each other.

Due to the tangential arrangement of the vanes any tendency for the material to be wrapped around the rotor is effectively avoided. Furthermore, the action of the vanes is such that a current of air is blown against the web of fibrous material, passing therethrough and serving further to loosen and fluff the material.

Due to the impact of these air currents and the beating applied to the web of material, the web is caused to float over the rotor and thereafter passes forwardly onto the conveyor belt 9 in a loose fluffed condition.

RUDOLF KERN,



PUBLISHED
APRIL 27, 1943.
BY A. P. C.

R. KERN
METHOD AND APPARATUS FOR THE LOOSENING
OF MATTED FIBROUS MATERIALS
Filed Aug. 5, 1940

Serial No.
351,493

Fig. 1

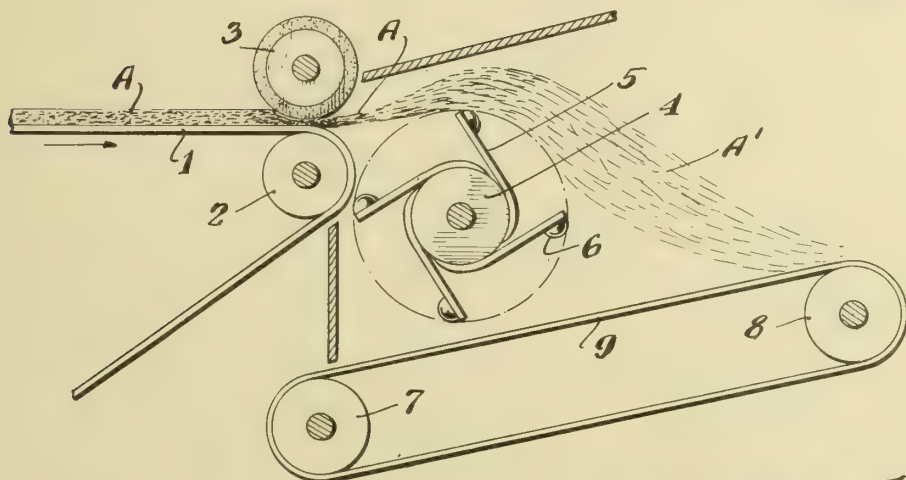


Fig. 2

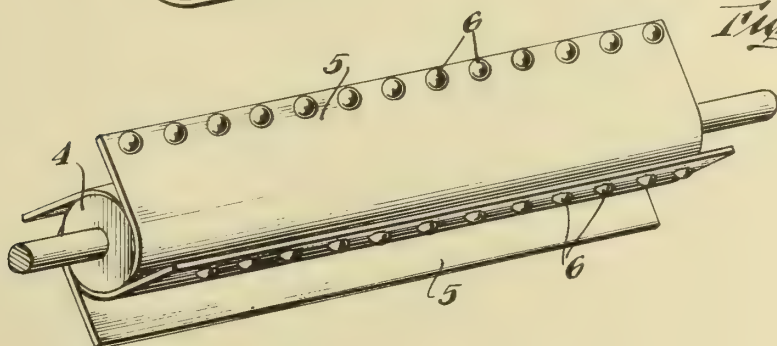


Fig. 3

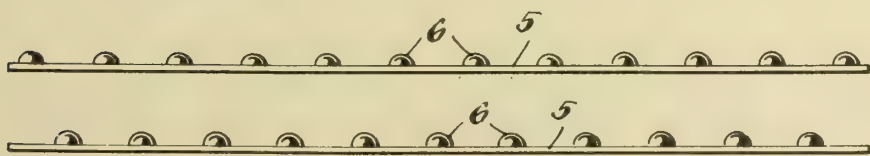
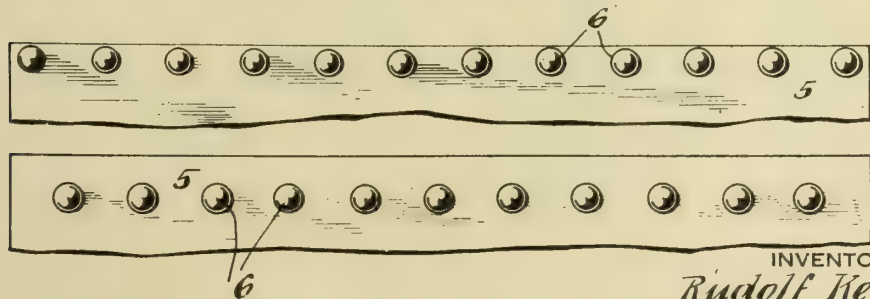


Fig. 4



INVENTOR
Rudolf Kern
BY *A. A. Kliche*
Charles H. Kliche
ATTORNEYS

ALIEN PROPERTY CUSTODIAN

BATHING CAP

Bela Szekeres, Budapest III, Hungary; vested in
the Alien Property Custodian

No Drawing. Application filed August 6, 1940

Bathing caps with embossed patterns are known. Until now such bathing caps have been made either by pressing out the mass of plastic raw rubber round a core provided with patterns and vulcanised thereon, or in such way that upon engraved rollers rubber sheets have been drawn out consisting of pieces having raised patterns following the contours of the cap, whereupon two cap-halves cut out from the sheet have been united along a seam and vulcanised. However these bathing caps having relief ornamentations have on the one hand been rather expensive, and on the other hand owing to the relatively considerable weight of the whole rubber ornamentation the wearing of these caps became inconvenient already after a short time.

Bathing caps with raised patterns of light weight have been produced also by means of less expensive methods in which case however the external embossed ornamentation of the cap has appeared at its inner side as a concave negative pattern. Such caps have particularly been made by dipping deposition moulds provided with patterns into aqueous rubber dispersions or by applying suction to raw rubber sheets through porous moulds, which operations have in each case been concluded by the vulcanisation of the raw rubber caps on the moulds.

However these caps had besides of their said advantages also the drawback that their raised patterns have been shallowed or flattened out in use, especially at their portions which were subject to greater stress.

The invention relates to a bathing cap which is provided with one or more hollow embossed ornamentations. Such embossed ornamentation may consist of a closed hollow body with a relief patterned surface, which hollow body may be applied to any desired place of the bathing cap. However the hollow embossed pattern can be produced also in such manner that a rubber sheet having a raised pattern, when applied to the surface of the cap, encloses therewith the cavity of the hollow embossed ornamentation. The cavity of the hol-

low ornamentation may be completely closed, although it is not essential at all that it should be airtightly sealed. The hollow embossed ornamentation may represent decorative figures of any desired shape, colour or execution, such as f.i. geometrical forms, human or animal figures, bows, etc.

The weight of the bathing cap according to the invention is small, as compared with other bathing caps having embossed patterns and thereby the raised patterns remain unchanged also during the wearing of the caps. Consequently the use of the caps according to the invention offers remarkable advantages.

The embossed rubber pattern can be produced in different ways. Generally it will be made independently from the cap, f.i. by pressing out in suitable pressing forms. Preferably however it is produced directly from a mixture of an aqueous rubber dispersion by means of any known shaping process such as f.i. dipping, electro-phoresis, etc. The uniting of the raised rubber pattern with the cap proper can also be effected in any desired manner, either in that the cap and the hollow embossed pattern are separately vulcanised and united with each other, f.i. by sticking or by that the raw cap together with the raw raised rubber pattern applied thereto are definitely united by vulcanisation.

It has already been known to use for the purpose of bathing caps a material consisting of two thin wrinkled rubber sheets, the wrinkles of which have each enclosed air in their cavities. The aligned air-filled rows of wrinkles have given to the material practically the appearance of a new working material, so that the cap had rather the character of a textile cap than that of a rubber cap. In contradistinction thereto, the bathing cap according to the invention completely retains the character of a rubber cap owing to the hollow embossed ornamentation being applied at certain places only.

BÉLA SZEKERES.

ALIEN PROPERTY CUSTODIAN

PAPER FASTENING DEVICES

Josef Kunert, Nixdorf, Sudetenland, Germany;
vested in the Alien Property Custodian

Application filed August 7, 1940

This invention relates to a paper fastening device of the type comprising a base and a movable top secured thereto at one end and kept at a distance therefrom by spring action when in inoperative position.

In order to permit inspection of the application of wire staples to the work and quick removal of trouble due possibly to the clogging of the staple guide it has been proposed to provide the staple magazine with a detachable covering plate. It is further known to divide the covering plate and detachably to secure the lower portion thereof to the magazine casing. All such devices are, however, open to the objection that the covering plate or a portion thereof has to be taken out of its working position and returned thereto after elimination of the trouble, which operations are often difficult to perform and always involve a loss of time.

The invention overcomes these drawbacks by movably securing the staple casing or magazine provided with a fixed covering plate to a swingable lever and holding it in operating position by suitable clamping means, preferably spring noses. According to the invention, the front portion of the staple channel or guide can be readily exposed to view by turning the lever backward until it strikes the base of the device. Continued backward movement of the lever severs the clamping connection between the lever and the magazine which moves away from the lever and exposes both the lever and the staple guide. After removal of the trouble the lever need only be swung back until it strikes the front part of the base and returns into clamped connection with the magazine.

One form of the invention is illustrated in the accompanying drawing, in which

Figure 1 is a side view of the device with the lever and staple magazine turned back, and

Fig. 2 is a front view showing the swung out lever.

The device comprises a base *b* provided with an anvil *a*. To the base *b*, by means of an interposed spring *c*, a swingable lever *d* is articulated, and the base is further provided with a longitudinally displaceable elastic work guide *e*. In the example shown, the swingable lever includes the members *d1*, *d2*, *d3* whose slot *f* serves for the reception of staples *g*. The staples *g* are forced in known manner by a spring-loaded slide *h* toward a driver *i* held in elevated position by a coil spring *k*.

The portion *d1* of the lever *d* has a rectangularly bent upper end *d1'* to insure good guiding of the staples. At *d1''* the bent ends *d1'* form a bearing for a shaft *l* to which a staple magazine *m* having, in the construction shown, trapezoidal shape is articulated, whose front face constitutes a covering plate *n* firmly secured to the member *m*. The casing *m* is enclosed on all sides to prevent the entrance of foreign bodies.

The side faces of the casing *m* possess punched noses *o* which serve as stops when the casing is moved back about the shaft *l*. The lower longitudinal edges of the side walls of the casing *m* are partly bent inwardly to act as springy noses *p* which hold the swingable lever *d* in operating position in the casing *m*.

It lies within the scope of the invention to employ other means for temporarily connecting the casing and the lever. It is further possible, without deviating from the principle of the invention, to impart a different form to the staple casing or magazine and to suitably vary the arrangement of casing and lever, the essential feature being only to permit temporary complete or partial detachment of the magazine from the swingable lever.

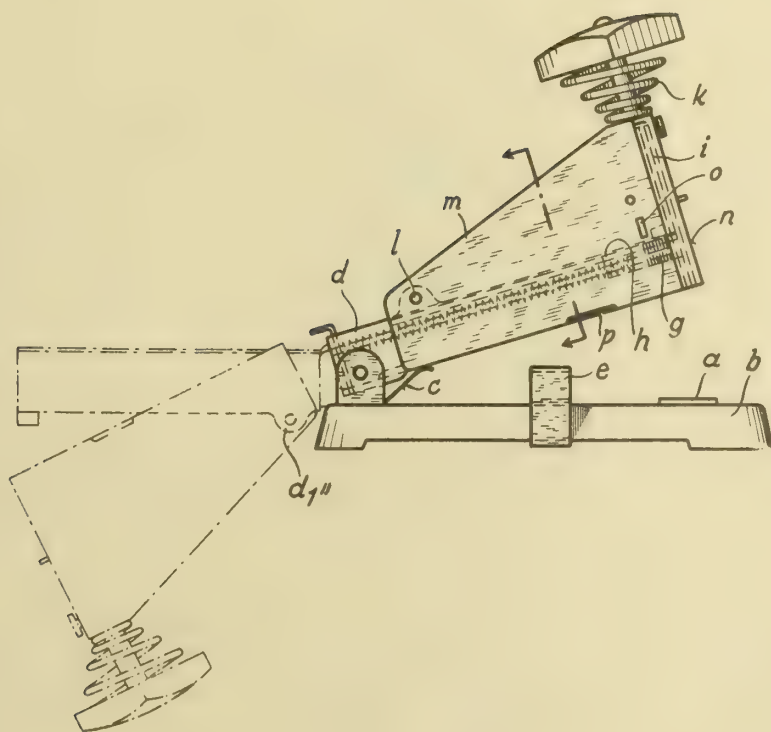
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PAPER FASTENING DEVICES
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Fig. 1.



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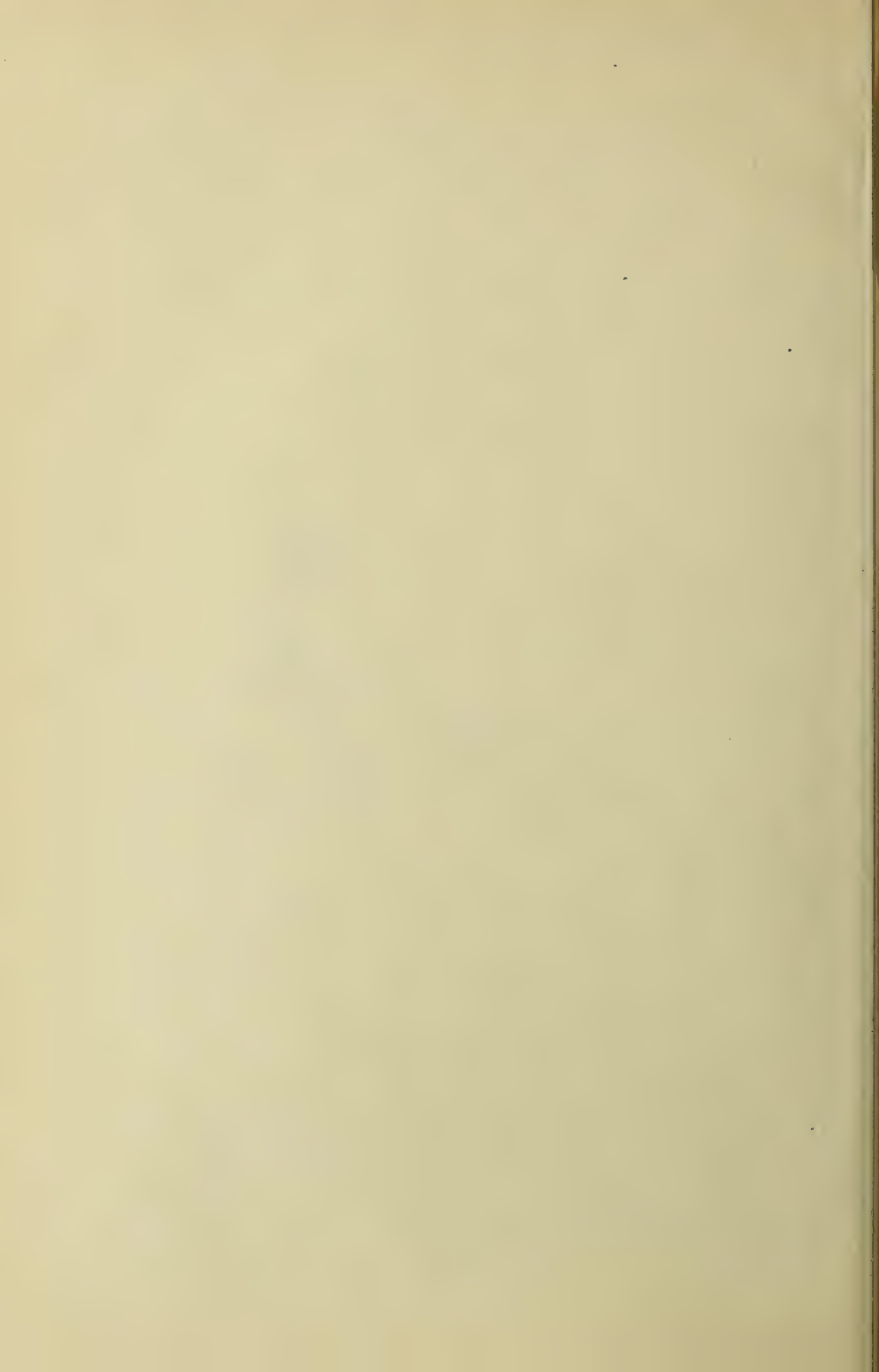


Fig. 2.

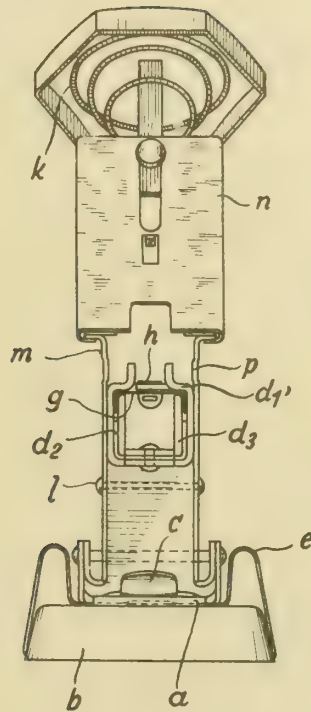
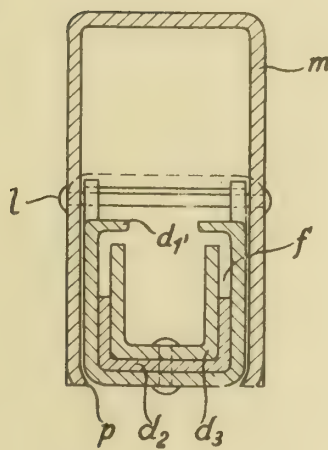
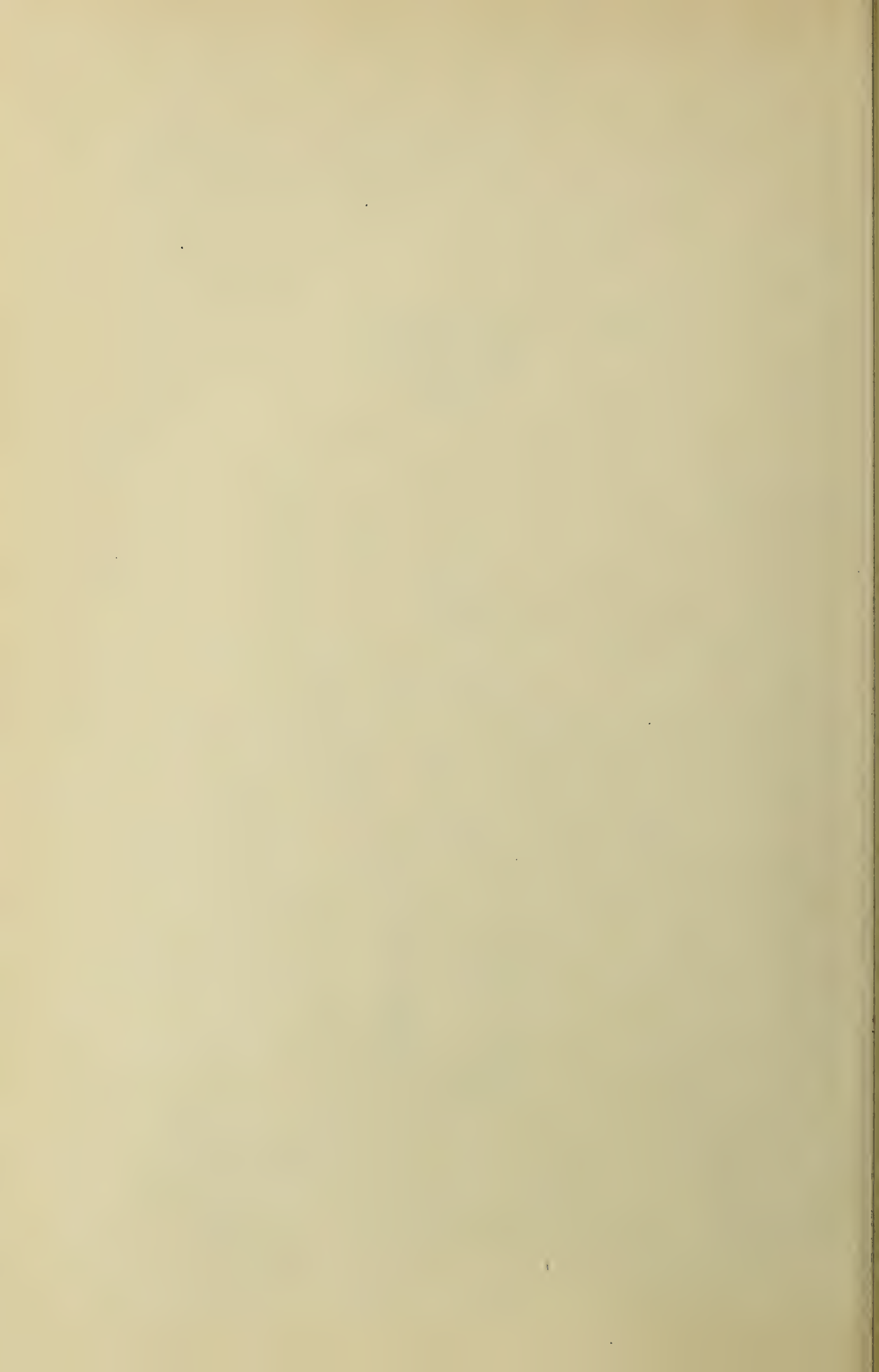


Fig. 3.



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ALIEN PROPERTY CUSTODIAN

HYDRAULIC STARTER

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Application filed August 10, 1940

The present invention relates to a hydraulic device for the starting of engines, more particularly internal combustion engines. It is a well known fact that the torque required to move or force an engine out of its state of inertia must have a value several times greater than that of the torque required to carry on the movement until the picking up of the engine. If the starting is effected by means of a hydraulic device, a high pressure corresponding to a high torque is required in the first instance which may be lessened, as soon as the engine has picked up. According to the invention it is proposed to feed the hydraulic motor serving to drive the starting device from a pump with a stroke volume increasing during the process of starting. Such pumps are known as radial piston pumps and axial piston pumps. It is more advantageous to provide for automatic control of the stroke adjusting member of an axial piston pump in the sense of an increase of stroke.

In this way the high torques requisite for starting the engine may be obtained by means of a very small electric motor serving to drive the pump. By increasing the stroke of the pump in the course of the starting process it becomes possible to distribute the available motor power in such a manner that considerable power is obtained at an inconsiderable displacement or high pressure at a slight delivery, respectively, and a lesser power at a greater displacement or lower power at a greater delivery, respectively, for revolving the engine preparatory to starting it. By providing a hydraulic pump with adjustable stroke it is possible as it were artificially to greatly multiply the torque exerted by the electric motor on the engine to be started. Hence it is not necessary to change the dimensions of the electric motor with a view to its function of starting the engine.

For obtaining automatic control of the stroke adjusting member it is advantageous to have an external force exert a rocking moment, decreasing at increasing rocking angles, on the stroke adjusting member in the sense of a stroke increase, said force being balanced by a counteracting rocking moment produced by the pump pressure. The external force may be supplied by a spring having a variable lever arm or by a spring system with non-linear force-displacement characteristic. The pressure dependent counteracting rocking moment may be produced in a manner already known by having the stroke adjusting member rock about a pivot lying outside the cylinder block axis, so that the pressures produced

in the working cylinders must shift the stroke adjusting member into its zero position.

It is essential that the pump produces the full pressure requisite for starting the engine only when the driving motor of the pump has attained to its full number of revolutions and has stored up a certain rocking force to be supplied during the starting process. For this purpose a pressure storing arrangement may be inserted in the pressure conduit of the pump to be charged during the starting period of the pump drive and retarding the attainment of the maximum pump pressure. It is advantageous to increase the retardation and to reduce the pressure from the storing apparatus, respectively, by taking care that the delivery is as small as possible during the starting period of the pump drive. This may be achieved in such a way that the pressure storing apparatus is formed as a cylinder with piston and that a spring is made expansible by means of the piston movement restricted by a stop, said spring exerting the rocking moment on the stroke adjusting member. A further step in this direction might consist in having the stroke adjusting member retained in a slightly deflected position during the piston movement by means of a locking device capable of being released by the piston.

In this arrangement the pump in the first instance at a small stroke delivers relatively small amounts for being stored in the storing arrangement. In this way sufficient time is afforded for the driving motor of the pump to attain its full number of revolutions. Only then the stroke adjusting member of the pump is released and subjected to the spring pressure, so that the pressure now may be increased up to a maximum determined by the spring. This maximum pressure suffices for starting the engine in question. As soon as this is in motion, the pressure is diminished which results in a further deflection of the stroke adjusting member. Further possibilities of retarding the pressure increase during the starting period are afforded, if the external force acting on the adjusting member is released when a certain number of revolutions of the pump driving gear has been reached.

This may be achieved in such a manner that a centrifugal pendulum coupled with the pump driving gear expands a spring exerting the rocking moment on the stroke adjusting member. Here also a locking device capable of being released by the centrifugal pendulum may be provided, said spring in the first instance keeping the stroke adjusting member in the zero position.

It is likewise possible to have the centrifugal

pendulum act directly on the stroke adjusting member, in which case, however, the point of application of the force would have to be chosen in such manner that a rocking moment, decreasing as the rocking angle increases, acts on the stroke adjusting member. In order to obtain the desired retardation during the starting period, the said member may be restrained in its zero position by a tension to be overcome by the centrifugal pendulum at a certain number of revolutions of the driving gear. Instead of a centrifugal pendulum other forces dependent on the number of revolutions may be used in the same sense, as for instance the pressure of a very small gear wheel pump.

The driving motor for the pump may be advantageously coupled with a swinging mass in order to store up energy.

The invention is illustrated in detail by some embodiments shown schematically.

Fig. 1 shows a starting device in which the rocking moment is exerted on the stroke adjusting member by means of a pressure cylinder connected to the consumption conduit, said cylinder having a piston moving therein which contracts a spring.

Figs. 2 and 3 show starting devices in which the rocking moment is produced by means of a centrifugal regulator. In all figures similar characters of reference designate corresponding parts.

In Fig. 1 the reference numeral 1 denotes an electric motor whose rotor 2 is coupled with a driving flange 4 of an axial piston pump 5 by a shaft 3. The shaft 3 of the electric motor 1 is supported in a casing 6 by means of ball bearings 7 and 8. A fly wheel 9 is rigidly connected to the shaft 3, said wheel being likewise enclosed in the motor casing. Piston rods 10 are articulately connected with the driving flange 4 of the axial piston pump 5, said piston rods causing via the pistons 11 a follow-up movement of the cylinders 12. This form of follow-up arrangement may however just as well be replaced by a Cardan joint arrangement. A cylinder block 12 is supported in a swinging frame 13 at the point 14, so that, as already explained elsewhere, the pressure produced in the pump cylinders 15 tends to adjust the swinging frame 13 in the sense of a stroke reduction of the pump 5. The control surface 16 of the cylinder block 12 is spherical and guided by a ball 18 at the driving flange 4 by means of a centering member 17 capable of being longitudinally displaced within the cylinder block 12 whereby overdetermination in the support of the cylinder block 12 between the driving flange 4 and the control surface 16 is avoided and a compensation for the displacements of the cylinder block due to the kinematic conditions is provided. The close contacting of the cylinder block 12 with the control surface 16 is ensured by the action of a spring 19 upon the centering member 17.

If the cylinder block 12 is inclined relative to an axis of the driving flange 4, as shown in Fig. 1, the pistons 11 move to and fro in the cylinders 15 and via the conduit 20 pump a certain amount of fluid into the motor 21 schematically represented as starting motor for instance for a combustion engine. From this the fluid is carried back via a conduit 21 to a container 23, in which the entire pump 5 is likewise arranged. A conduit 24 branches off from the conduit 20, said conduit 24 leading on the one hand to a pressure storing arrangement 25 and on the other

to a cylinder 26, in which a piston 27 is movably arranged. When moving in the cylinder 26 the piston 27 strikes against a lug 28 of a lever supported at 29, which is acted upon by the tension of a spring 32 mounted at 31 on the cylinder 26. In consequence of the lug 28 being struck by the piston, the lever 30 is rocked about the point 29 and releases a locking arrangement 33 so that the rocking frame 13 is free to swing the pump 5 by an angle α_{max} . This movement is likewise imparted by means of the piston 27, which contracts a spring 36 articulately connected with the rocking frame 13 and resting against the piston 27, said spring being expanded as a result of the movement of the piston 27 in the cylinder 26. The piston 27 in addition possesses a pin-like lengthening piece 34, the spring 36 being guided on said piece 34 as well as on a pin 35 mounted on the rocking frame 13. A stop 38 is provided to adjust the rocking frame 13 in its initial position, i. e. at a certain angle of α_{min} .

The illustrated starting device operates as follows: When the electric motor 1 is switched on it begins to move slowly and sets the axial piston pump 5 connected with it going so as to deliver pressure fluid to the pressure storing arrangement 25 and the motor 21, respectively, via the conduits 20 and 24. The pressure storing apparatus operates in such manner that the pressure in the conduits 20 and 24 in the first instance does not reach any high values, hence the motor 1 is not forced to exert any great force and is thus capable of reaching the desired number of revolutions within the starting period. When this point has been reached—provided the pressure storing apparatus possesses suitable dimensions—the condition will have been attained at which the pressure in the conduits 20 and 24 will increase considerably. As the pump 5 in the position illustrated operates at the angle α_{min} , said position corresponding likewise to the initial position, a high pressure may be exerted by the pump at a small stroke. The pressure thus reached suffices to start the pressure fluid motor 21 coupled with the motor to be started. Almost simultaneously or even previously the piston 27 will have released the locking arrangement 33 via the lug 28 and the lever 30 so that the rocking frame 13 may be deflected due to the effect of the spring 36 having been expanded by the piston movement. This spring tension is opposed by a force produced by the excentric support of the rocking frame in the sense of a stroke reduction. As the pressure in the conduits 20 and 24 meanwhile has been reduced by the starting of the motor, the stroke reducing force is likewise diminished and the cylinder block carrier 13 is deflected further under the influence of the spring 36 until finally the angle α_{max} has been reached. Thus increasing pressure fluid quantities are being supplied to the motor 21 at decreasing pressure. The force necessary to achieve this is supplied by the motor 1 due to the fact that the swinging mass 9 thereof is only required to bridge over the requisite high initial moment. When the motor has picked up, which should be the case at about the angle of α_{max} of the rocking frame, the pressure in the conduits 20, 24 reaches zero. The spring force, due to the backward stroke of the piston, is likewise reduced to zero and the rocking frame returns to its initial position.

It is of course possible to dispense with the locking at 33. In such case the pump at the

starting of the motor 1 due to the slight counter-pressure in the conduit 20 would assume the angle α_{\max} , returning to α_{\min} at increasing pressure, whereupon the opposite movement would take place at diminishing conduit pressure.

As shown in Fig. 2, centrifugal weights 41 are articulately connected at 40 to the shaft 3 of the electro-motor 1 via levers 43, 44 and via levers 45, 46 with a sleeve 47 which is shiftable in the direction of the axis of the shaft 3 under the influence of the centrifugal weights 41, 42. The sleeve 47 in turn is connected to a lever 48 swingably supported at 49. A spring 50 is articulately connected to the lever 48 at the point 51, the free end being connected at 52 with the rocking frame 13 of the pump 5. The spring 50 at a displacement of the sleeve 47 tends to shift the rocking frame 13 in the sense of a stroke increase. The articulate connection of the spring has been effected in such manner that the rocking moment produced by it is reduced at an increasing rocking angle.

The pump 5 in its initial position is restrained in the zero position by a lug 53. A rocking moment is not produced until a lever 54 possessing a stop 55 is rocked about the point 57 by a pin 56 secured on the lever 48. A spring 58 forces the lever 54 on to the pin 56. The moment operating in the sense of a stroke decrease in the same way as shown in the embodiment according to Fig. 1 is effected through the excentric support of the rocking frame 13 about the axis 14. The conduit 20 again leads to a pressure fluid motor which is suitably connected with the motor to be started. In all other respects the starting device of the construction shown in Fig. 2 corresponds to that of Fig. 1 with the exception that the pressure storing arrangement and the piston exerting the stroke increasing rocking moment on the rocking frame are missing.

The illustrated starting device operates as follows: In its initial position the pump 5 is at the stroke position of zero. Hence it is possible for the motor 1 on having been switched on to reach its requisite number of revolutions without being submitted to any special load. At the increase in revolutions the centrifugal weights 41, 42 being forced to move outwardly contract the spring 50 and over the lever 54 actuated by the pin 56 release the locking arrangement 53, 55, so that the pump 5 may be angularly deflected. Under the influence of the pressure now produced in the

conduit 20, the pump deflects by small angles, at which high pressure suitable for effecting the starting of the respective motor may be exerted at small strokes. This starting moment resulting from the high pressure, as shown above is bridged over by a fly wheel coupled with the motor 1. As soon as the motor to be started has been set in motion, the pressure in the conduit 20 falls off with the result that the moment acting on the rocking frame 13 in the sense of a stroke decrease is likewise reduced. Due to the external force now exerted by the spring 50, the frame 13 swings at greater angles, finally assuming the maximal stroke position when the motor has picked up, in which position large pressure fluid amounts are delivered. When the number of revolutions of the motor 1 declines, the lever 48 again approaches its initial position, which results in a relaxation of the spring 50 so that the pump 5 may also revert to its zero position, in which it may be aided by the force of a spring.

In Fig. 3 the centrifugal pendulum formed by the weights 41, 42 and the levers 43 to 46 directly acts upon the rocking frame 13 at the stroke adjusting member via a lever system 60, 62 secured on the one hand at 61 to the lever 48 connected with the sleeve 47 and on the other hand at the point 67. The points 61, 67 from which the rocking frame 13 is swingable are chosen so as to ensure that a rocking moment declining at increasing rocking angles acts on the stroke adjusting member. Here likewise it is of course necessary to effect a retardation of the pressure increase during the starting period of the electro-motor 1. In this instance this is effected in such a manner that the stroke adjusting member 13 is restrained in its zero position by a tension to be overcome by the centrifugal pendulum, as for instance in such a way that the lever 48 is retained by a catch 63 turnably supported at 64 and acted upon by a spring 65. The operation of the device described should be apparent from the above description.

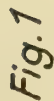
An mentioned in the beginning, the invention is not limited to the embodiments described. In addition to other obvious advantages, one principal advantage of the starting device consists therein that several motors may be started by means of but one pump, this being provided for several motors connected therewith for instance by a multi-way stop cock.

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APRIL 27, 1943.

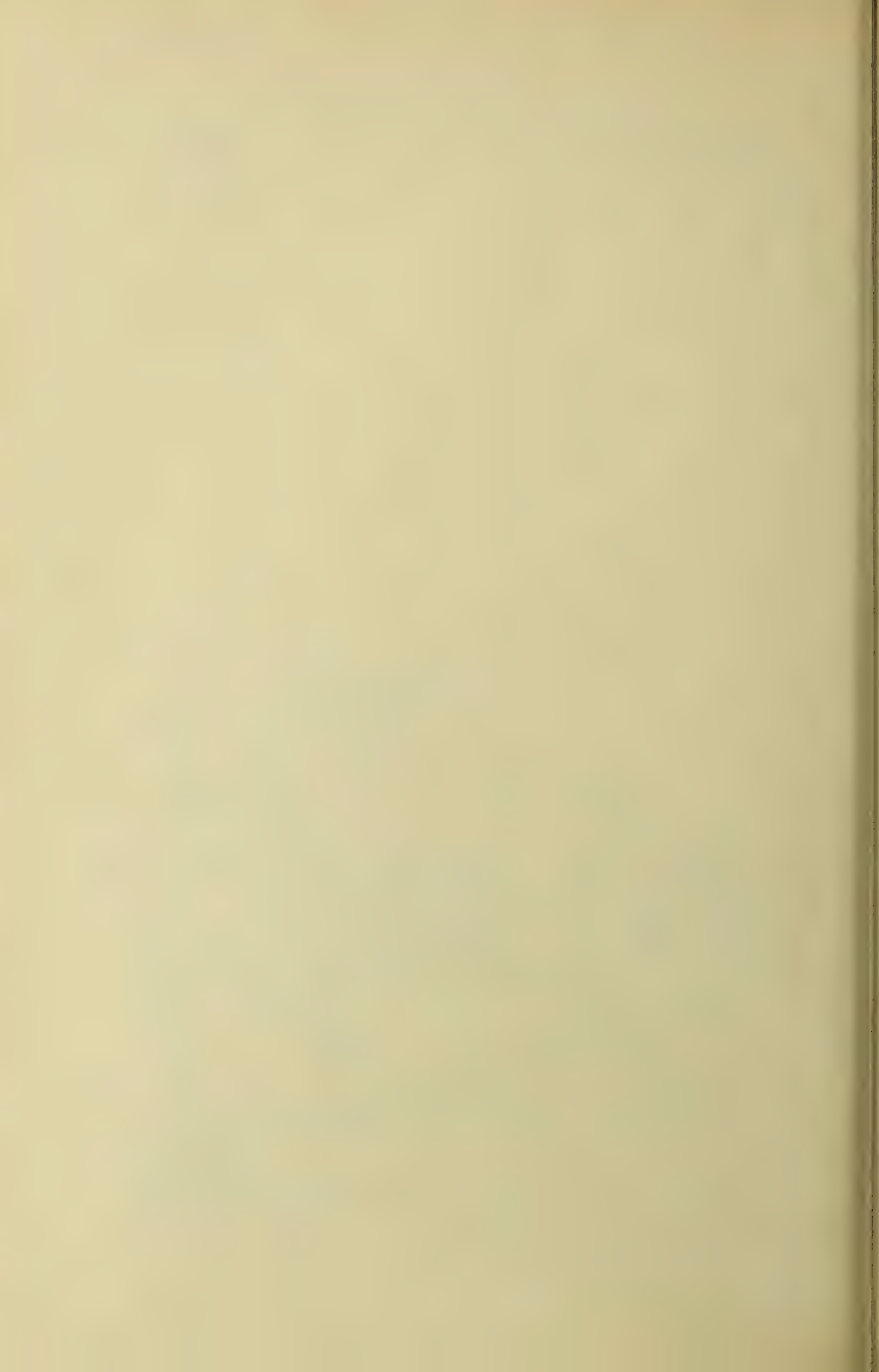
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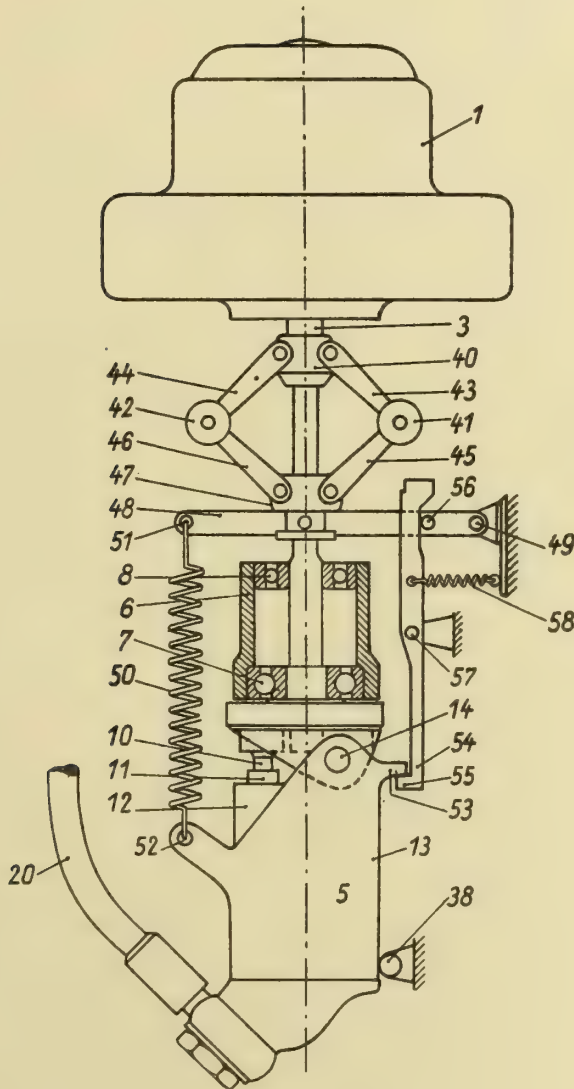


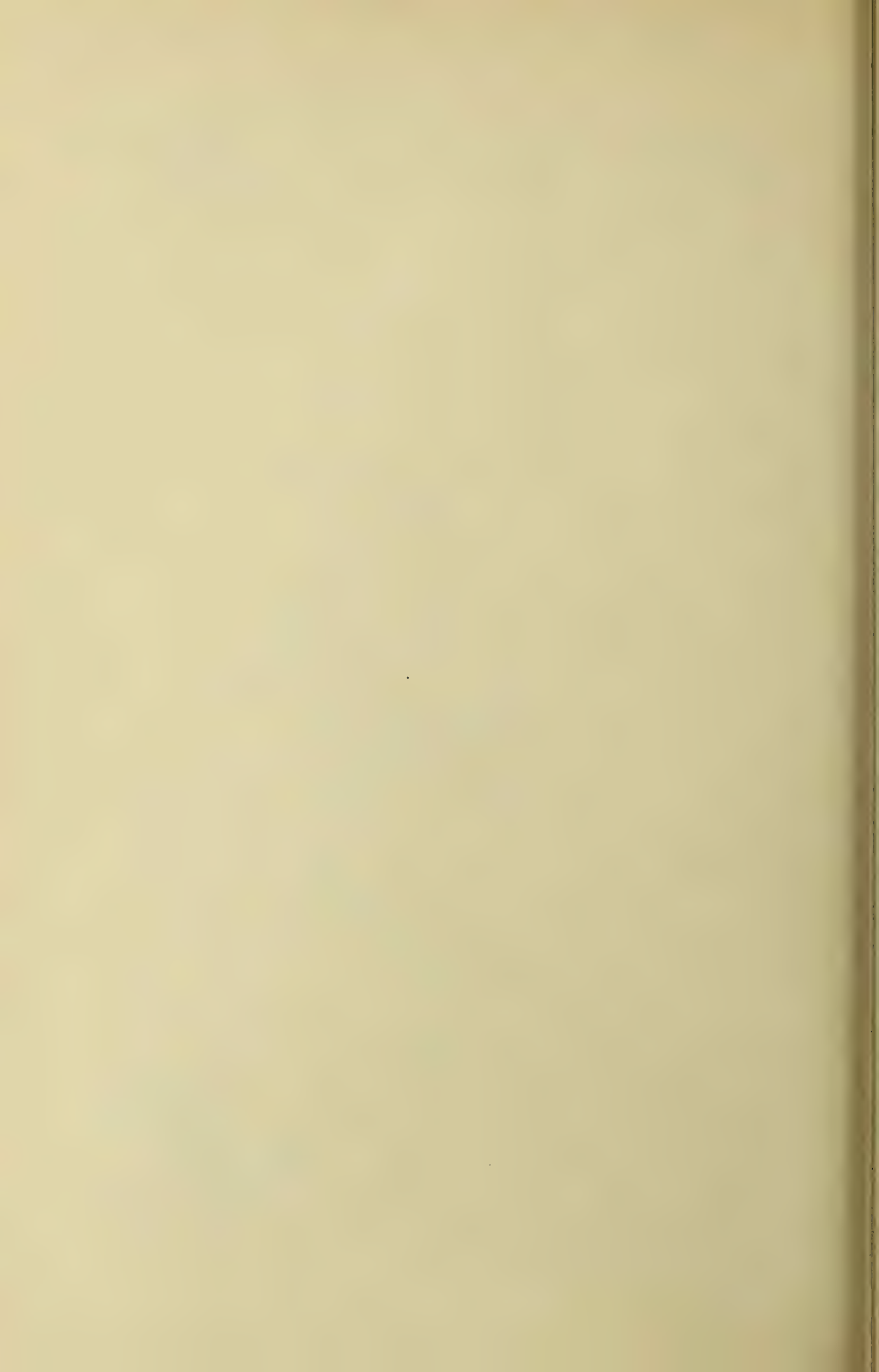
Fig. 2

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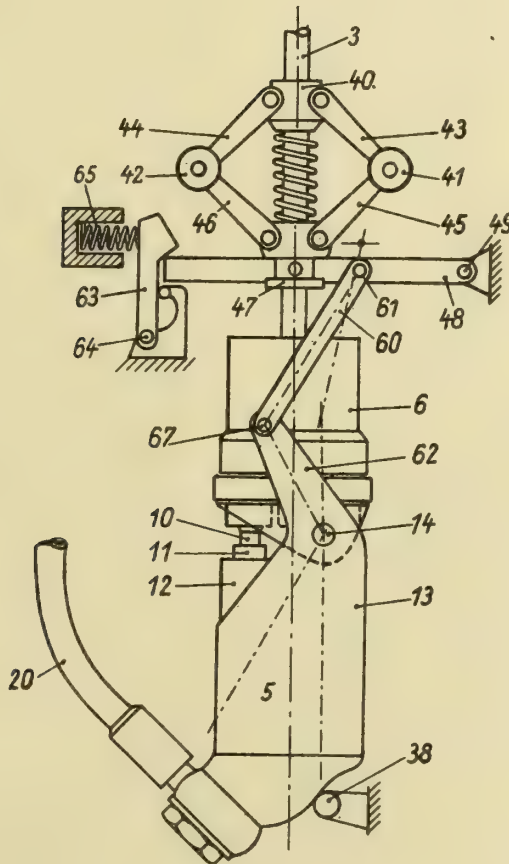
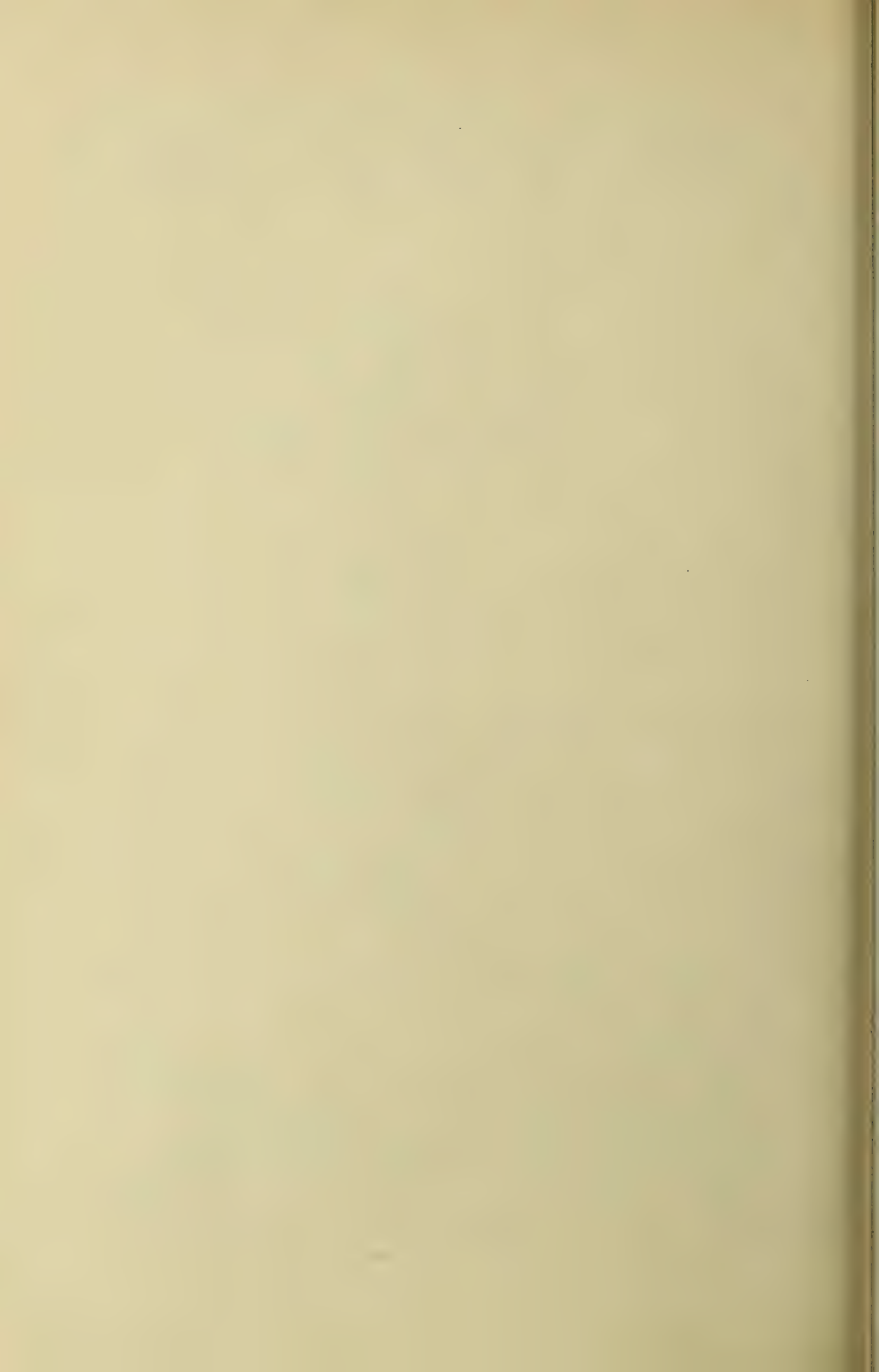


Fig. 3

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ALIEN PROPERTY CUSTODIAN

LIQUID CHANGE-SPEED GEARING

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Application filed August 12, 1940

The usual liquid gearings operating according to the displacement principle consist of a primary part (liquid pump) and a secondary part (liquid motor) which both can be regulated by the readjustment of certain members, for instance by eccentric shifting of the outer casing of an enclosed device. The readjustment of the respective members for the purpose of regulating the number of revolutions, as well as for exerting an influence upon the output or upon the turning moment can be effected either directly manually or indirectly with the aid of servo motors. The readjustment can, furthermore, be effected perfectly freely or in dependency of a service magnitude of the driving motor of the gearing or of the machine to be driven.

For solving the various problems connected with the regulation mentioned control gearings have been designed by means of which either the primary part and the secondary part are actuated by separate readjusting members or both said parts are regulated by a readjusting member common to them.

In very many cases in which liquid driving gears are used it has been found to be advantageous to drive them on the one hand with as low oil pressure as possible and on the other hand with as uniform efficiency as possible. With this manner of operation in view a control gearing operating with a common readjusting member for the liquid pump and for the liquid motor has already been suggested, this control gearing operating in such a manner that the volume of liquid which the pump delivers at the greatest absorption capacity of the motor is increased from zero, and the absorption capacity of the same is decreased only after the full pump output has been attained. This control gearing, assumed that it answers the purpose in view, presents, it is true, the advantage that the drive always starts with the greatest turning moment possible, but it presents nevertheless also two essential drawbacks as dealt with hereinafter.

In order to prevent the path of the operating member from becoming too long, it is necessary to resign such delicate regulation as otherwise customary with liquid driving gears. To stop the secondary part of the gearing, that is to say, to stop the driven machine, it is, first of all, necessary to regulate the absorption capacity of the liquid motor to its maximum, and only then the output of the pump is reduced whereby, as a matter of course, the stopping of the machine takes place correspondingly slowly which cannot be consented to in many cases.

The present invention aims at driving the machine to be driven with the greatest possible or available turning moment, but rendering it nevertheless possible to stop it very quickly without giving rise to faulty connections. The invention starts from the principle known with control gears having a common readjusting member for the liquid pump and the liquid motor to increase the output of the pump from zero at the greatest absorption capacity of the liquid motor, and to decrease the absorption capacity of the same only after the full output of the pump has been attained. The increase of the pump output from the zero output need not, of course, be continued until the full output has actually been reached, but need be driven only to a certain most favourable value, in that it is often times suited to the purpose in view to make use of the capacity of the pump at first only partly and to increase the output thereafter according to the increase of the number of revolutions.

The invention consists therein that the primary part and the secondary part are simultaneously readjusted back to their starting position when the gearing is stopped. Another characteristic feature of the invention is that, likewise for the purpose in view, a connection is established within the gearing members effecting the readjustment, said connection containing a yieldable member or an equivalent member capable of equalising the generally unequal readjustment of the pump and the motor. There is attained by this contrivance the further advantage that the regulation of the liquid motor can be rendered as delicate as desired.

The invention is illustrated diagrammatically and by way of example on the accompanying drawings on which Figure 1 is a horizontal section through the entire arrangement and combination of parts constituting my invention. Figures 1a, 1b, 1c and 1d show certain details more fully referred to hereinafter, Figure 2 is an illustration especially of the piping with its accessories, and Figure 3 is a wiring diagram, likewise with its accessories.

On the drawings, 1 (Fig. 1) denotes the readjustable part of the liquid pump, and 2 denotes the readjustable part of a liquid reversing gear not shown on the drawings pertaining to the present application but being shown and described in the USA Patent No. 2,049,092, dated July 28, 1936, which relates to a rotary piston engine, especially for fluid gears. The readjustable part of the pump is provided with a threaded tubular branch 4 engaged by a threaded spindle 3

turnable by manually movable lever 5. This lever is affixed to an annular member 17 connected by feather and groove with a shaft 3' forming an extension of the threaded spindle 3. The output of the pump from zero to the maximum can be regulated by turning the shaft 3' in the one or the other direction of the reversing gear according to the direction in which the readjustment is effected.

The readjustable part 2 of the motor is provided with a bolt 19 bearing a rotatory roll 21 on a transverse axle 20. This roll engages a guide slot 22 provided in the drum 7 which is firmly keyed to the shaft 6 to which, besides, is firmly secured an annular member 18 provided with a hand lever 8. The shaft 6 is supported in the stationary frame of the device in which also another parts are supported.

The shape of the guide slot 22 appears from Fig. 1a which shows a development of the drum 7. The roll 21 is shown in its normal position in said slot, this being the position in which the motor has its greatest absorption capacity, the lever 5 being locked in this position of the roll by means of certain members separately provided for that purpose, and the locking being maintained as long as the pump remains adjusted for zero output or for running idle. Said locking member is constituted by a drum 12 secured to the shaft 3' and provided with a control groove 30, the shape of which appears from Fig. 1b that shows a development of said drum 12. The control groove 30 is engaged by one end of a double-armed lever 13 supported on a pivot 26. The other end of this lever is coupled with a bolt 28 guided in a sleeve 25 and being surrounded with two helical compression springs 29 and 29' holding said lever in its middle position. A transverse pin 27 of the bolt 28 bears a guide roll 24 engaging a guide slot 23 provided in the annular member 18. The shape of the slot 23 appears from Fig. 1c in which is shown a development of the member 18. The roll 24 is here shown in its locking position.

The hand lever 5 is locked in its readjusted position in a certain particular manner hereinafter dealt with by means of a bolt 14 cooperating with a cam groove provided in the annular member 17. The profile of this groove appears from Fig. 15 which shows a development of said member 17. This latter is furthermore provided with clutch claws 10 engaging similar claws 11 of a counter clutch member 9 when this member is axially shifted. It is designed as a sliding coupling and supports a cog-wheel 15 which meshes with a cog-wheel 16 keyed to the shaft 6.

The manner of operation of the above-described device is as follows: In the position shown in Fig. 1 the device is in its no-load position in which the pump is adjusted to zero output and the motor to its greatest absorption capacity, whereas any readjustment is prevented by the locking members 13, 23 and 24. If now the hand lever 5 is moved by turning the shaft 3' so as to adjust the pump for a sufficiently large output, say for instance, the largest possible output, the locking having been effected up to then by the members 23 and 24, is broken across the lever 13 and the members 27 and 28 owing to the suitable shape of the guide slot 30, in such a manner, that at a certain distinct position of the hand lever 5 (for instance for running forward) this lever can be turned only in the appropriate one direction, whereas turning in the other direction cannot take place. When the lever is released for

the other direction (for instance for rearward running) the former direction will be blocked. Simultaneously therewith the annular member 14 and, thus, also the hand lever 5 are locked by the bolt 14 in such a manner that this lever can be further moved either not at all or can be further moved only in the same direction. Now the absorption capacity of the motor is changed with the aid of the lever 8 across the shaft 6 and the cam drum 7, it being at the same time rendered possible to increase the output of the pump. The cam drum 7 has symmetrical shape so that the liquid motor can be readjusted for both directions of turning of the lever 8 from its position for greatest absorption capacity in the same direction. In order to stop the gearing the annular member 17 is shifted together with the lever 15, and the clutch 10, 11 is thrown into gear and simultaneously therewith the bolt 14 which locks only in one direction of motion of the lever 5 becomes inactive. The lever 5 can now be moved back into its former position, whereby the output of the pump will be reduced and simultaneously therewith the liquid motor will be brought to its greatest absorption capacity across the cog-wheels 15 and 16.

The ratio of transmission is preferably so chosen that the longest operating path of the motor corresponds with the operating path of the pump. In order to prevent the motor from being again readjusted to a smaller absorption capacity by an erroneous connection after the pump has only partly been readjusted to its former output, without adjusting simultaneously therewith for a larger output, the bolt 14 prevents the disengagement of the clutch 10, 11 until the lever 5 has arrived in its zero position and the bolt 14 engages the cam groove or is locked. In the first case the bolt 14 must be released either prior to the restarting of the gearing or simultaneously therewith.

In Fig. 2 is illustrated a hydraulic control device designed according to this invention. The control piston valve 120 readjusts the pump 1 and the control piston valve 121 readjusts the liquid motor 2. The direction of the readjustment of the pump 1 is determined by the piston valves 122 and 123, and the direction of the readjustment of the motor is determined by the piston valves 124 and 125; the piston valves can be moved into the position necessary at the time being by means of the hand levers 126 and 127, whereby the admission of the liquid under pressure delivered by an auxiliary pump 128 to the slide valves 120 and 121 can be regulated. The liquid under pressure passes through an overcharge valve 129 and through pipes 130 and 131 directly to the piston valves 122 and 123, or 124 and 125 respectively, but it flows through the pipe 132 only after the readjusting piston valve 120 for the pump has been shifted from its middle position. The auxiliary slide valve 133 serves solely for equalising the pressure within the control gearing, which operates as follows:

In the no-load position of the gearing, that is to say, at zero output of the pump, the control piston valves 122, 123 and 124, 125 are in the position shown in Fig. 2. The liquid under pressure withdrawn from the receptacle B by the auxiliary pump 128 acts upon both sides of the piston 120 through the pipe 130 as well as through the pipes 134 and 135. The piston 120 is maintained in its middle position by two helical compression springs balancing one another, and by the spring-actu-

ated bolt 136 which engages a recess 136' of the piston rod 120.

The liquid pressure presses, furthermore, through the pipes 131 and 132 upon the front surface of the piston valve, in such a manner, that when this valve is in the position shown in Fig. 2, the liquid motor has its greatest absorption capacity. The excess of the liquid under pressure escapes into the receptacle B through the overcharge valve 129.

The piston valves 124, 125 cannot be readjusted by hand, if the pressure exerted upon the front surface of the piston 125 is sufficiently high, as the oppositely located surface of the piston 124 is connected with the receptacle B of the auxiliary pump.

In order to start the gearing for running in the one or the other direction the piston valves 122, 123 are readjusted forwardly or rearwardly by means of the hand lever 126 so that either the pipe 134 or the pipe 135 is closed and the pipe 139 or 140 respectively is opened. But then the pressure of the liquid acts only on the one face of the piston 120 which is now shifted, together with the readjustable part 1 and counter to the action of the springs 146, 147. The locking bolt 136 is either separately withdrawn or simultaneously with the described other operation by means of the lever 136, or it is automatically released with the aid of the piston 120. In this way the readjustable part 1 of the pump can be regulated up to a certain intended position, preferably with the aid of stationary abutment members, that position corresponding with the largest output.

In order to render it possible to drive the gearing also with any desired small outputs, the piston valves 122, 123 can be so designed that the piston 122 closes in one position the pipe 134, as well as the pipe 139 and the piston 123 closes in one position the pipe 123, as well as the pipes 140 and 135. After the piston 120 has covered a certain intended readjusting path, may be, for instance, the entire readjusting path, it opens the pipe 132' and connects thereby the upper face of the piston 124 with the pressure pipe 130. Under the same circumstances it is suited to the object in view to provide two pipes 132' in order to render it possible to adjust the piston paths independently from one another in both directions to which they are being opened. The pressure of the liquid upon the piston valves 124 and 125 is now equalised so that these valves can be moved forwardly by actuating the lever 127 manually and the pipes 138 and 141 are closed and the pipes 137 and 142 opened. Owing hereto, the front face of the piston valve 121 is relieved from the pressure and the rear face thereof subjected to the pressure so that the valve 121 is moved forwardly and the liquid motor is readjusted to a smaller absorption capacity. When the intended number of revolutions has been attained, the hand lever is actuated so as to move the piston valves into their middle position in which they shut the four pipes 137, 138, 141 and 142 whereby the piston valve 120 will be locked. The locking of this piston can, however, be dispensed with if, with the purpose of choosing already, preliminarily the highest number of revolution, abutment members for the readjustment of the liquid motor are provided, these members being then adjusted with respect to the intended highest number of revolutions. The pipes 143, 144 and 145 serve for discharging the pressureless liquid conveyed, while the piston valves are being

moved, into the oil receptacle B or into the suction space of the auxiliary pump.

In order to stop the gearing the piston valves 122 and 123 are moved into their middle position by means of the lever 126 so that the liquid pressure exerted upon both faces of the piston 120 is of equal height and this piston is then moved back into its middle position by the springs 146 and 147. In this position the piston 120 shuts the pipe 132', whereas the piston 133 opens the pipe 144. The rear face of the piston valve 124 is, thus, not subjected to pressure and the two piston valves 124 and 125 are, therefore, moved into their end-positions by means of the liquid under pressure arriving through the pipe 111 whereby the pipes 138 and 137 will be connected with one another and the pipe 137 will be shut. The piston 121 readjusts, therefore, the liquid motor to its greatest absorption capacity whereby the initial position is re-established.

Figure 3 shows an electric control device designed according to this invention. The readjustment of the part 1 of the pump and of the part 2 of the motor is effected, for instance, by an electromotor 250 or 251 respectively, driving a worm-gear 252, or 253 respectively, and moving thereby a nut 254, or 255 respectively, connected with the pump part and the motor part, whereby the eccentricity of these parts is changed. On said spindles 254 and 255 are cams or equivalent members 258, 259 which serve for operating switches 260, 261, 262, 263, 264, and 265 cooperating with push buttons 266, 267, 268, 269, and 270, whereby two reversing relays 271 and 272 for the motors 250, 251 as well as auxiliary relays 273 and 274 are to be controlled. The manner of operation of this control device is as follows:

In the initial position of the members, as shown, the output of the pump is zero and the motor has its greatest absorption capacity. All relay coils are currentless. To throw the gearing into gear either the push button 266 or the push button 268 is depressed according to the direction of rotation desired whereby either the coil a71 of the relay 271a or the coil b71 of the relay 271b acts upon the appertaining core, or armature. The operating procedures are equal for both directions of rotation. It will, therefore, suffice to describe in detail the operating procedures taking place with one direction of rotation. When the push button 266 is depressed the coil 71 is supplied with current across the switches 260 and 263 and across the auxiliary relay 274 whereby the reversing relay 271a will be actuated so that the motor drives the pump. At the same time a cam disk 258 has been turned by the rotating readjusting spindle 254 whereby the switch 262 will be switches off by means of the bridge 275. The liquid motor is now in that position in which its absorption capacity is greatest. It cannot at the time being be readjusted in that the coil b72 of the reversing relay 272b remains currentless even if the push button 270 is depressed, as the appertaining circuit is broken at the switches 261 and 260. Only when the pump has attained its largest output and the reversing relay 271a and, thus, also the electromotor 250 have been disconnected, or switched off respectively, by means of the switch 260, the circuit for the coil b72 can again be closed across the switches 265 and 260 by depressing the push button 270 and actuating the auxiliary relay 274.

It is, of course, possible to separate the two contacts of the switch 260 from one another in order to render it possible to operate the switching-on

contact for the circuit of the coil **672** over a shorter readjusting path of the pump part than over the switching-off contact for the circuit of the coil **671**. The coil **672** actuates the reversing relay **272b** whereby the motor **251** is switched on and the liquid motor is readjusted during that period of time in which the push-button is kept depressed, or until the terminal switch **265** has been switched off by the cam disk **259** rotated together with the readjusting spindle **255**, the circuit for the reversing relay is now interrupted. In the meantime the switch **264** has been switched on and now is it possible to effect an adjustment for any desired number of revolutions by operating the push button **269**, or **270** respectively.

To stop the gearing the push-button **267** is depressed whereby first the coil **673** of the auxiliary relay **274** so that the relay **273** is operated. This latter closed now the circuit for the coil **674** which actuates the auxiliary relay **274** whereby the circuit for the coil **673** is broken across the auxiliary relay **274**. Simultaneously therewith the coil **671** and with it the reversing relay **271b** are switched on across the relay **273** and the switches **262** and **261**, so that the coil **673** remains switched on across this relay. Owing to the actuation of the reversing relay **171b** the electromotor **150** runs in a direction reverse to that which existed when the gearing was switched on. It regulates the pump to zero output across the readjusting spindle. In the zero position the circuit for the coil **671** is interrupted by the switch **262**. In the meantime and simultaneously therewith the circuit for the coil **672** has been closed across the switch **264** and the relay **273** for actuating the auxiliary relay **274**. By actuating the reversing relay **272a** the electromotor **251** readjusts the liquid motor to its greatest absorption capacity until the circuit for the coil **672** is being broken by means of the switch **264** with the aid of the cam disk **259**. In order to render possible that the liquid motor can be regulated as delicately as the invention aims at, a circuit for the coil **674** is lead across the switch **264** whereby the relay **274** remains in operated state until the greatest absorption capacity of the liquid motor has been attained.

In order to prevent faulty connections the switches **262** and **263** are so designed that, after the pump has been switched on in the one direction, the readjustment in the other direction can be effected by depressing the push button

267. In order to secure the zero position of the pump there can be provided, by way of addition, a rest that is to be actuated by a magnet.

On the preceding pages a mechanical, a hydraulic and an electric control device for liquid variable speed gears able to run in both directions have been described in order to present examples for applications of this invention. It is a matter of course that the control device designed according to the invention can be materially simplified if the gearing need run only in one direction as in such a case all control members requisite for the other direction can be dispensed with and besides the reciprocal locking of the control members can become simpler. A particular case of employing the invention exists if the regulation of the liquid gearing is effected by remote control, for one direction only. In order to render it possible to turn the working machine to be driven also in the other direction, an additional manually operable readjusting device can be provided, formed for instance in a particularly simple manner by a hand wheel adapted to be coupled with the shaft of the control motor of the pump and to be normally actuated after a stationary abutment member determining the zero position of the pump has been disengaged. It is in this case suited to the purpose intended to provide a sliding clutch between the control motor and the readjusting spindle in order to render it possible to readjust the pump with the aid of the electromotor until it contacts with the abutment member and to disconnect the control motor only thereafter.

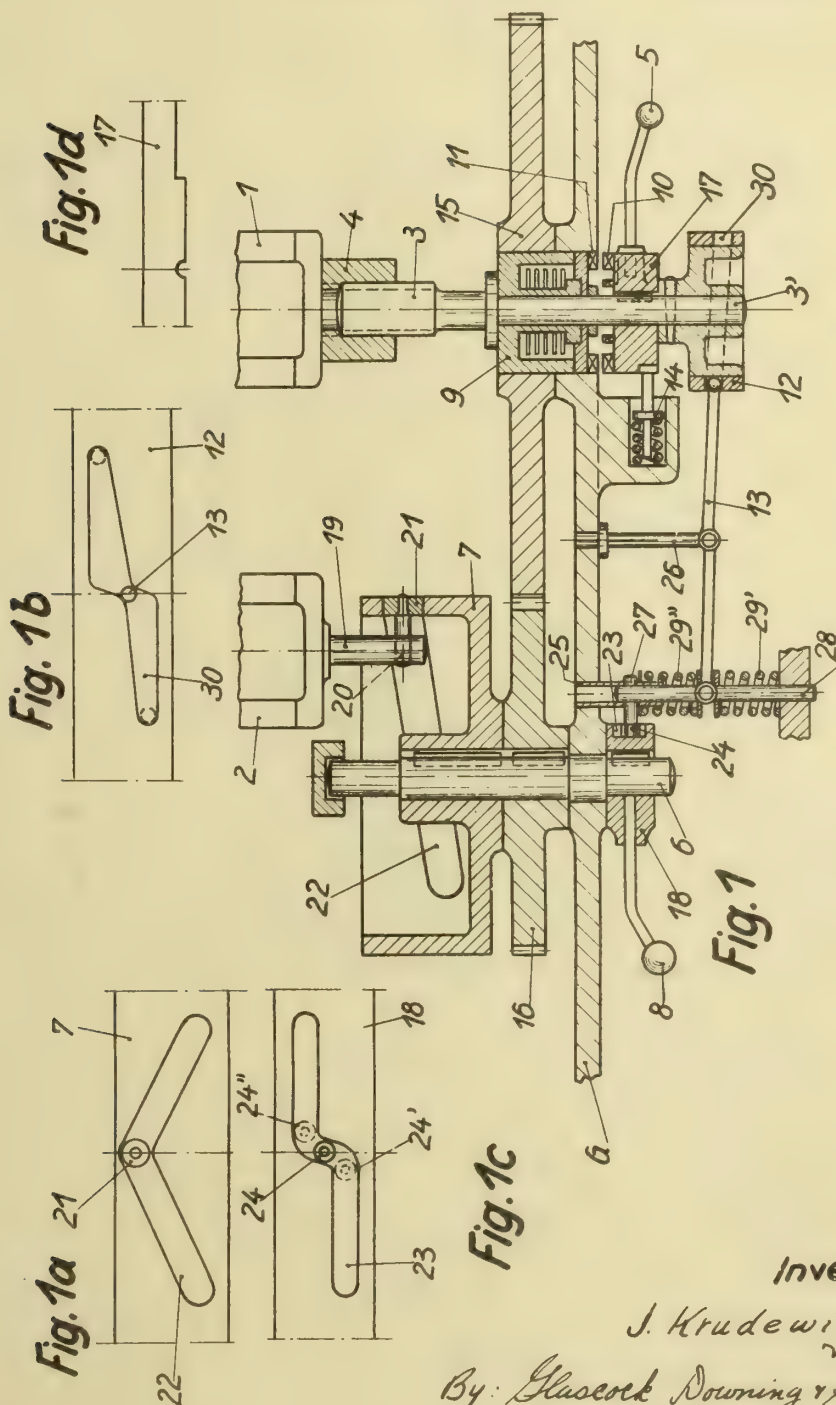
In the examples in question the primary and the secondary part are regulated by separate readjusting members. The fundamental principle of the invention to readjust while the gearing is thrown into engagement first solely the primary part at the greatest absorption capacity of the secondary part and to regulate this part only thereafter, whereas on disengaging the gearing said parts are readjusted in common, but I wish it to be understood that the invention can be used also in connection with so-called one-level control devices although in such a case the advantage to obtain a sufficient delicacy of the regulation in the case of only short switching-on and switching-off paths must be given up in a certain degree.

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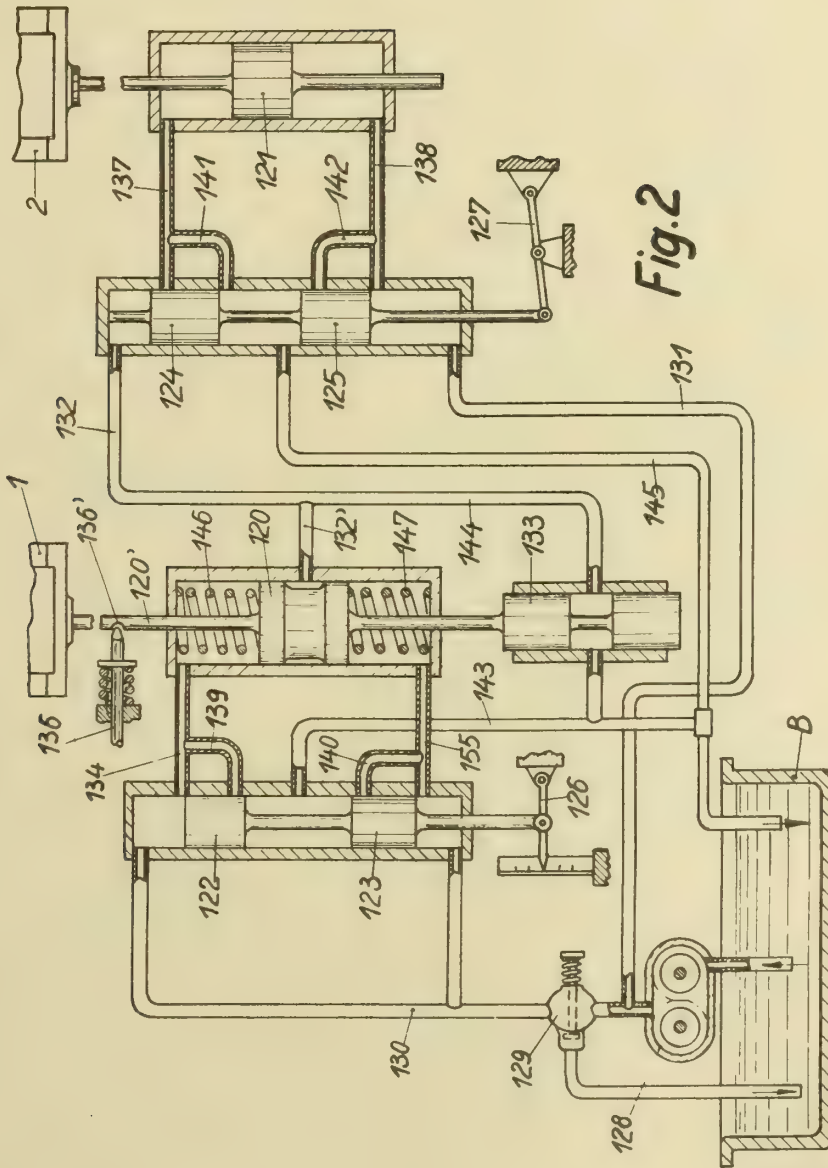


Fig. 2

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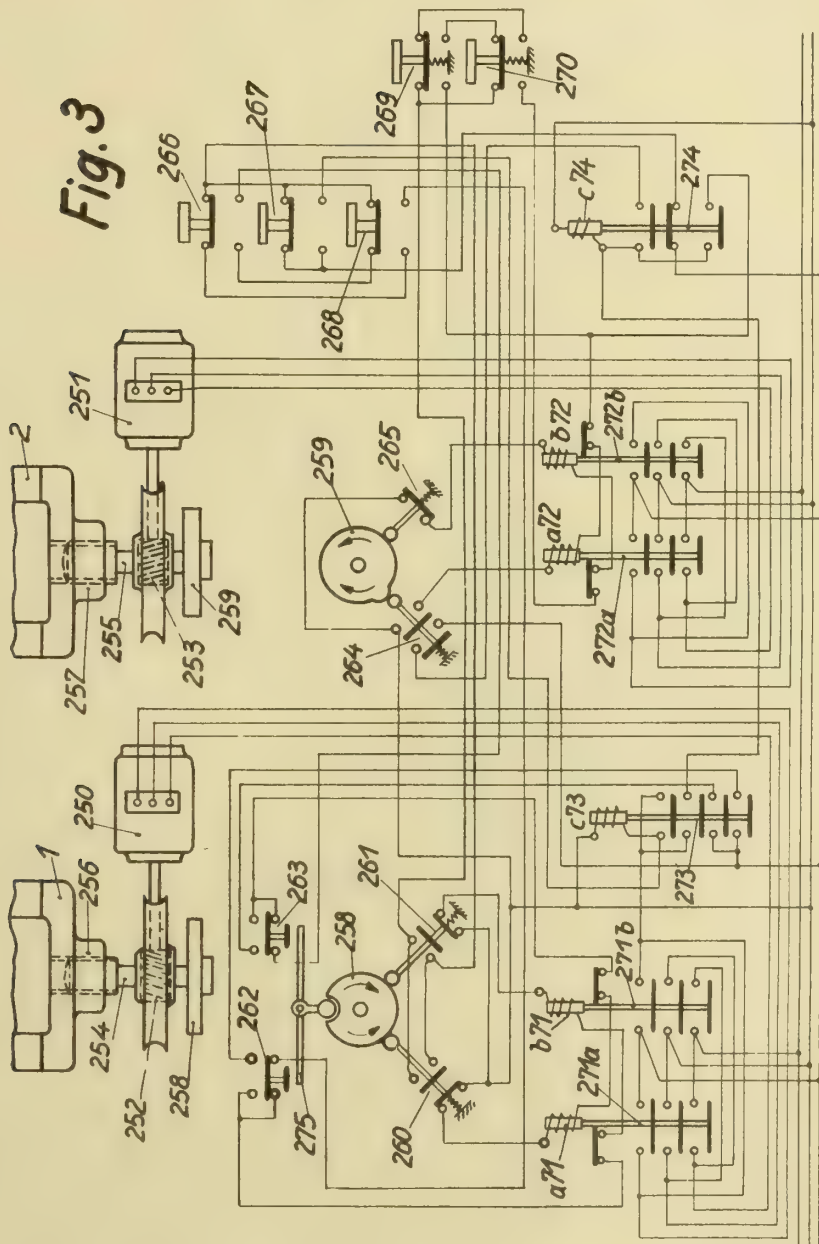


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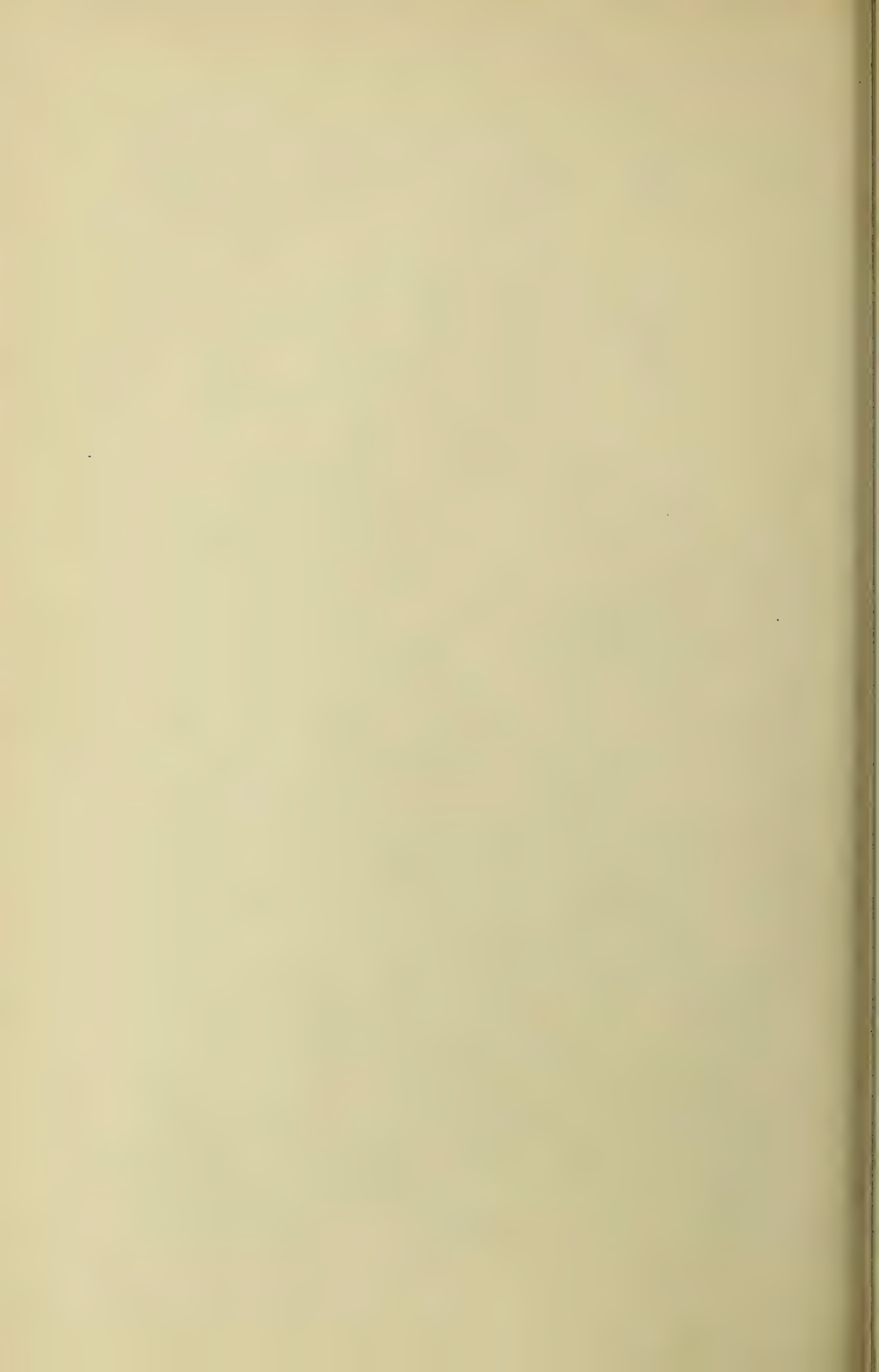
3 Sheets-Sheet 3



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PROCESS FOR THE PRODUCTION OF SHAPED STRUCTURES FROM REVERS- IBLY MOLDABLE SYNTHETIC RESINS

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Application filed August 13, 1940

This invention relates to the production of shaped structures from reversibly moldable synthetic resins.

It is known to produce shaped structures from synthetic resins, for instance polystyrol, polyvinyl carbazole, in such a manner, that for instance by a drawing process these structures show special orientation in one direction only and therefore special properties with regard to tenacity and pliability.

According to methods hitherto known it was not possible however to produce shaped structures, such as filaments, rods, tubes and the like consisting of preferably linear molecules which exhibit an orientation-effect in several directions.

It is an object of the present invention to manufacture shaped structures from reversibly moldable synthetic resins.

A further object is to produce by special mechanical means an orientation-effect of the resins in different directions, thereby improving the tenacity of the products.

These and other objects will become apparent from the following specification.

The present invention is based on the observation, that it is possible to manufacture shaped structures, such as filaments, rods, tubes and the like by extruding them in a plastic, liquid or dissolved state from a nozzle rotating quickly around its axis, and finally cold drawing said structures in the direction of the extrusion. In this way also these simply shaped structures such as filaments, rods, tubes and the like show an orientation-effect in several directions which greatly improves the tenacity of the product.

The additional drawing of the structure extruded from the nozzle is preferably accomplished in such a manner, that the extruded filament is wound up on a cylinder or roll or on other suitable rotating means, the peripheral speed of which, however, is higher than the speed the filament is discharged with from the nozzle.

The drawing of the filament being extruded from the nozzle may be accomplished according to the present invention also in such a way, that the filament is passed between rolls or cylinders being arranged behind one another, the peripheral speed of which increases from step to step. Repeated drawing occurs hereby according to the groups of rolls, in between which the filament passes, whereby the drawing force may gradually decrease from step to step. By these means an

enhanced drawing effect of the final product and correspondingly a higher orientation effect is obtained.

Reference is made to the accompanying drawing in which Figure 1 is a diagrammatic view of an extruding device using a cylinder to wind up the filament.

Figure 2 represents mechanical drawing means. There is used a plurality of cylinder groups, in between which the extruded filament passes through,

The filament *c* consisting of thermoplastic synthetic resins and being extruded from the nozzle *b* which rotates in the bearings *a*, is wound up in coils on a cylinder *d*. Said cylinder rotates in the bearings *e* with a higher peripheral speed than the corresponding extrusion velocity.

According to Figure 2 the filament *c* leaves the rotating nozzle *b*, passes in between the cylinder groups *f*, *g*, *h* and is finally wound up on a roll *i*. These cylinders *f*, *g*, *h* and the roll *i* are driven with a peripheral speed increasing from the nozzle-opening towards the cylinder *i*, whereby the peripheral speed of the cylinder *f* is already higher than the extrusion velocity of filament *c*. Gradual drawing of the filament or tube is therefore attained between the nozzle-opening and the cylinder group *f* as well as between the cylinder groups *f*, *g*, *h* and the cylinder group *h* and cylinder *i*. By this drawing action in connection with the torsion caused by the rotating nozzle, there is accomplished an orientation effect which is characterized by a considerably improved tenacity of the particular products.

According to the present invention there may be worked up all synthetic resins possessing preferably a linear structure of the polymeric molecules. To these synthetic products there belong especially the polymerisates or interpolymerisates of vinyl chloride, vinyl acetate, vinyl alcohol, vinyl carbazole, maleic acid anhydride, isobutylene and similar compounds. By the present invention there is attained on all these materials an orientation effect which greatly improves their tenacity. This is especially true for the superpoly-condensates which according to this invention represent a most suitable material, such as the superpolyamides and polyamide condensation products which are obtainable either from dibasic acids and dibasic amines or from aminocarboxylic acids and their lactames.

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PROCESS FOR THE PRODUCTION OF SHAPED
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FIG. 1

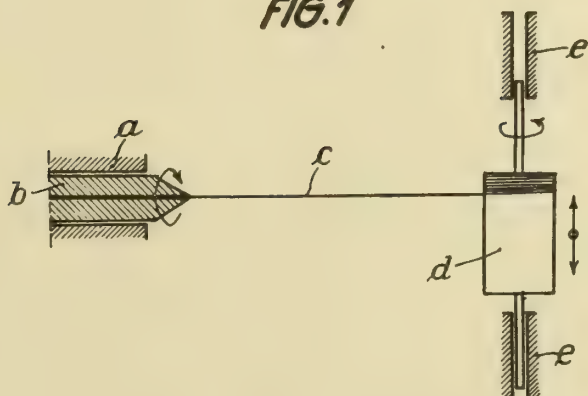
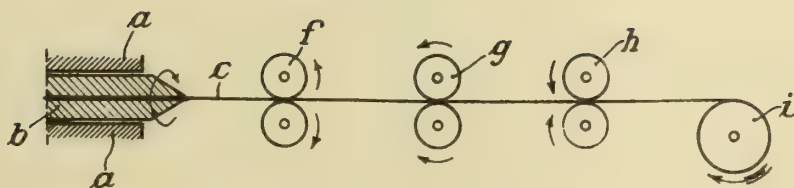


FIG. 2



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ALIEN PROPERTY CUSTODIAN

APPARATUS FOR CARRYING OUT CATALYTIC GAS REACTIONS

Wilhelm Pfannmüller, Mannheim, and Josef Reichart, Ludwigshafen-on-Rhine, Germany; vested in the Alien Property Custodian

Application filed August 13, 1940

The present invention relates to improvements in and apparatus for carrying out catalytic gas reactions.

In carrying out exothermic and endothermic catalytic processes in a chamber containing a bundle of tubular reaction vessels, it is essential that the fresh gases, while being led in the space around the tubes which are charged with catalytic material and thus being in heat exchange relation to the gas within the tubes, should remove from or supply to all tubes an equal amount of heat and meet the first catalytic layers over the whole cross-section with as equal a temperature and in as equal amounts as possible. Difficulties, however, are encountered in the attempt to obtain an entirely satisfactory uniformity of distribution of the gas, since the usual means, such as annular distribution plates arranged above the entry channel of the fresh gas, if desired in combination with rakes or aprons arranged beneath the said distribution plates, or stowing rims provided at the gas entry or the like, do not prove fully sufficient.

In accordance with our present invention the gases, before passing along the tubes charged with catalytic material, are uniformly distributed in controllable proportions over the whole cross-section, by conveying the fresh gases from the mantle surrounding the bundle into a number of cells which subdivide the cross-section of the chamber into spaces embracing each practically equal number of tubes and being provided with control means for securing an individual attendance of each cell from outside. We prefer in practice to subdivide the space around the tubes into cells of an approximately equal cross-section, preferably by partition walls arranged in radial and tangential direction. Into each of the cells thus formed the gases are supplied through channels formed by suitable side walls fitted in the gas distribution space of the chamber. Each supply channel and hence each cell is provided with a control valve mounted to the chamber wall. In order to enable a controlling of the gas supply to the different cells, the temperature of the gas led around the tubes is measured in each cell by means of a thermo-element or the like and adjusted by means of the control valve. The control valves, since they are partly arranged one above the other, are advantageously provided with a flat, instead of with a round passage cross-section, so that with a small elevation a large cross-section for the gas passage is set free which can be adjusted to any aperture from the closed to the fully open state.

The above described arrangement allows of a very favourable distribution of the gas over the whole cross-section of the chamber so that the temperatures measured in the catalyst mass at any distance from the base would vary over the whole cross-section of the chamber by a few degrees centigrade only.

The nature of the invention will be further described with reference to the accompanying drawings which illustrate an arrangement of apparatus suitable for carrying out catalytic reactions in compliance with the present invention.

Referring to the drawings, Fig. 1 is a vertical section through a chamber comprising a great number of reaction tubes wherein the first catalytic mass A is arranged in the space around the tubes, the second catalytic mass B is arranged inside the tubes, while the third catalytic mass C is arranged in a space provided beneath the bundle of tubes. Fig. 2 represents sections on lines $x-x$; $y-y$ and $z-z$ of Fig. 1.

The fresh gas is supplied through the spout a to the annular channel b surrounding the mantle of the chamber. By means of the valves c which are distributed over the mantle (see Fig. 2) underneath the annular distribution plates d , e , f (see Fig. 1), the gases are led from the annular channel into the chamber in regulated portions, where they are conveyed to the different cells.

The subdivision of the cross-section of the chamber into a series of cells of about equal size and being built up by radial partitions g and tangential polygon-forming partitions h , is apparent from Fig. 2.

The supply of gas from the control valve to the corresponding cell is defined by lateral walls i and k between the different distribution plates. In the example represented by the drawing, the upper of the three distribution plates communicates with 12, the medium one communicates with 6 and the undermost plate communicates with 3 cells.

As illustrated in Fig. 1, the radial as well as the tangential partitions of the cells are carried upwards approximately to the catalytic mass B and the cross-section of the catalyst tubes is largely reduced over an equal length, in order thus to create as much free space as possible for the inflow of the gas. Above the reduced parts the cross-section of the tubes is so enlarged that the tubes nearly touch each other. Due to this fact the fresh gases led from off a cell under the enlarged bundle of tubes remain within the bundle apportioned to the said cell, until they meet the catalytic mass A. Moreover, the reduced cross-

sectional area around the tubes which results from the said enlargement of the tubes, is attended by a marked increase of the velocity of the fresh gases along the catalytic mass B which again enables a good transition of heat from the tubes to the fresh gases on this way. On the other hand, the contraction of the tubes in the gas distribution space, where a good exchange of heat is not desired, will subdue such an exchange of heat.

In order to further subdue the exchange of 10

heat in the gas distribution space, that part of the contracted tubes which is situated beneath the distribution plates where the fresh gases meet the tubes in a cross-current, may be heat-insulated by short protective tubes *l* or protective sheets *m* (see Fig. 1 and 2). In some cases it is advisable to carry the cellular subdivision through over the full height of the reaction chamber.

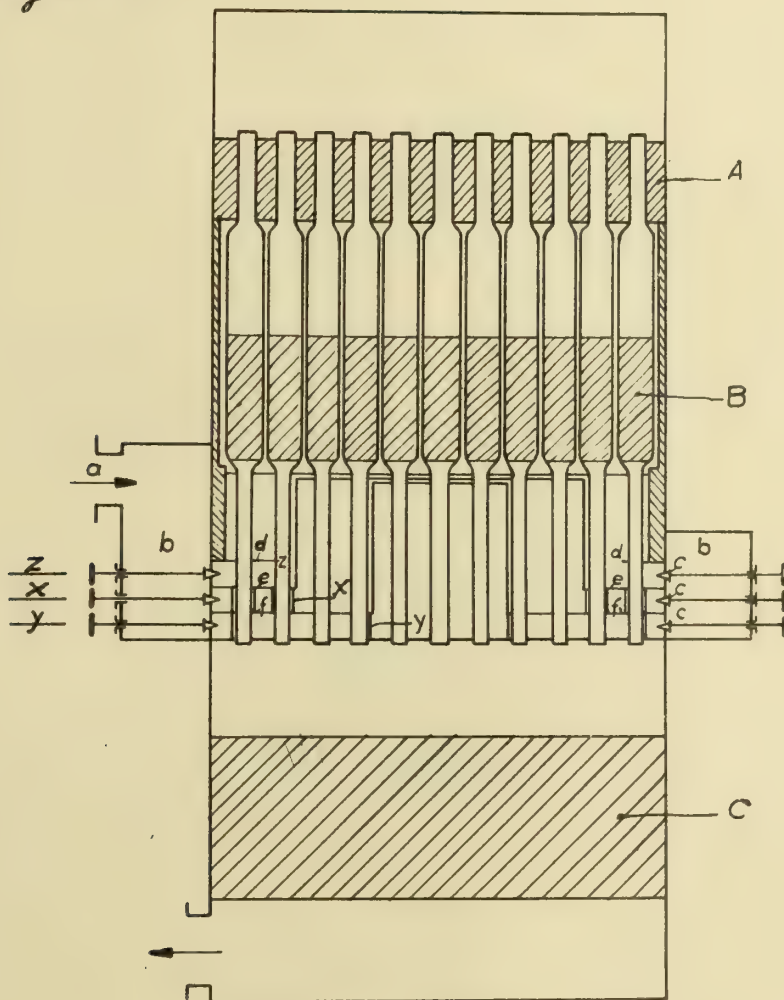
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Fig. 1

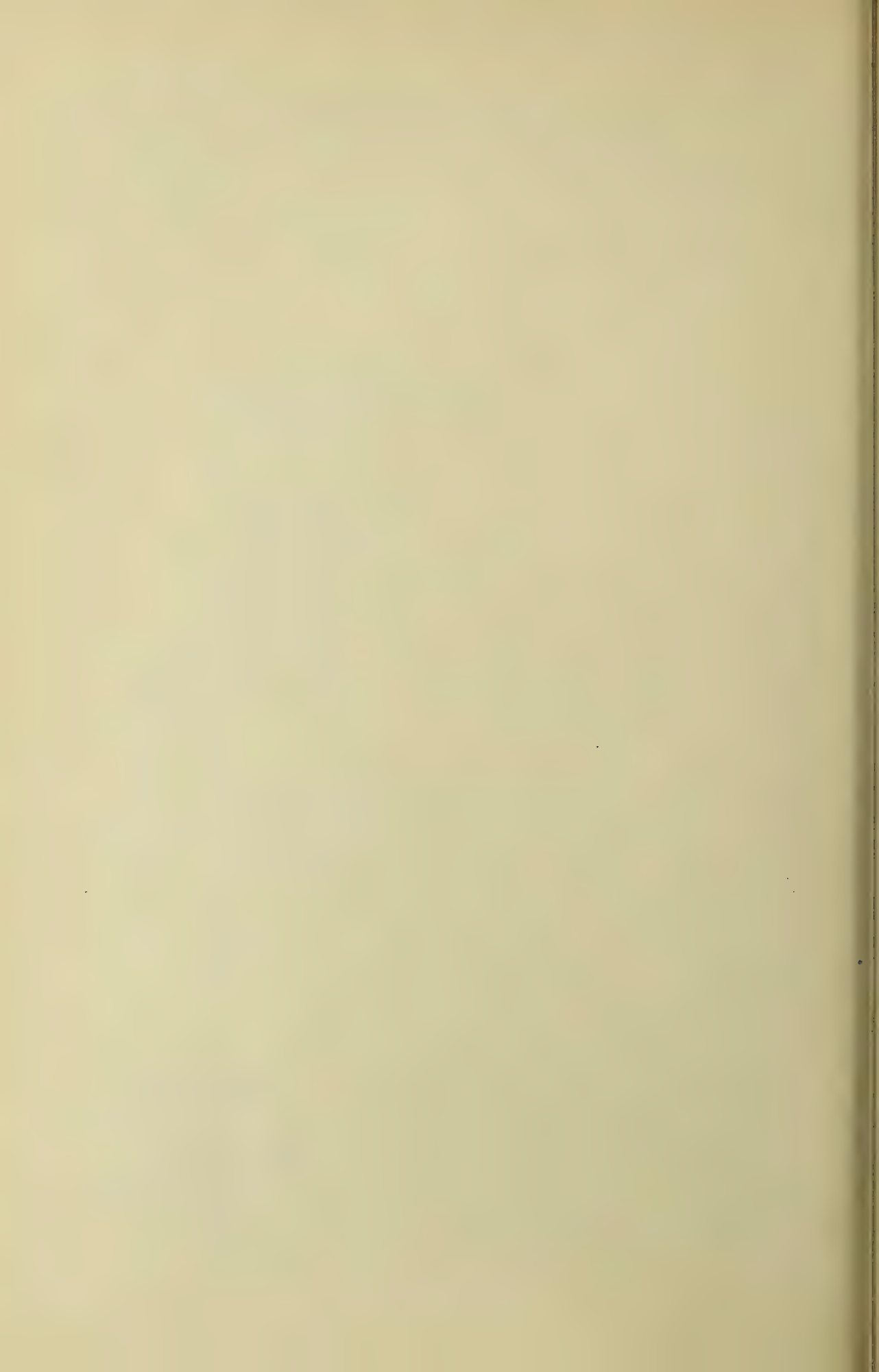


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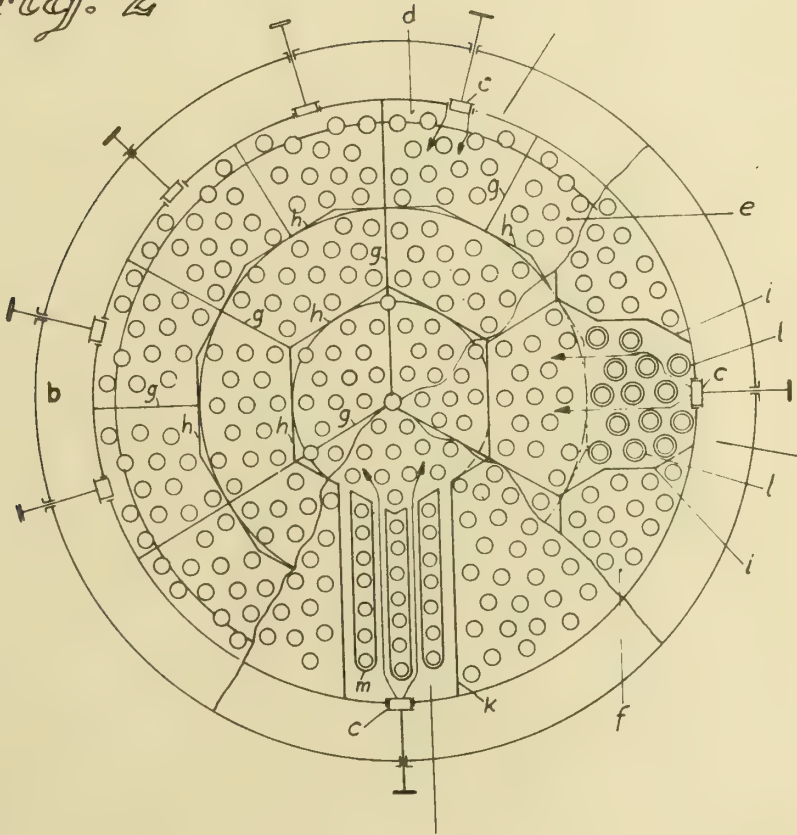


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Fig. 2

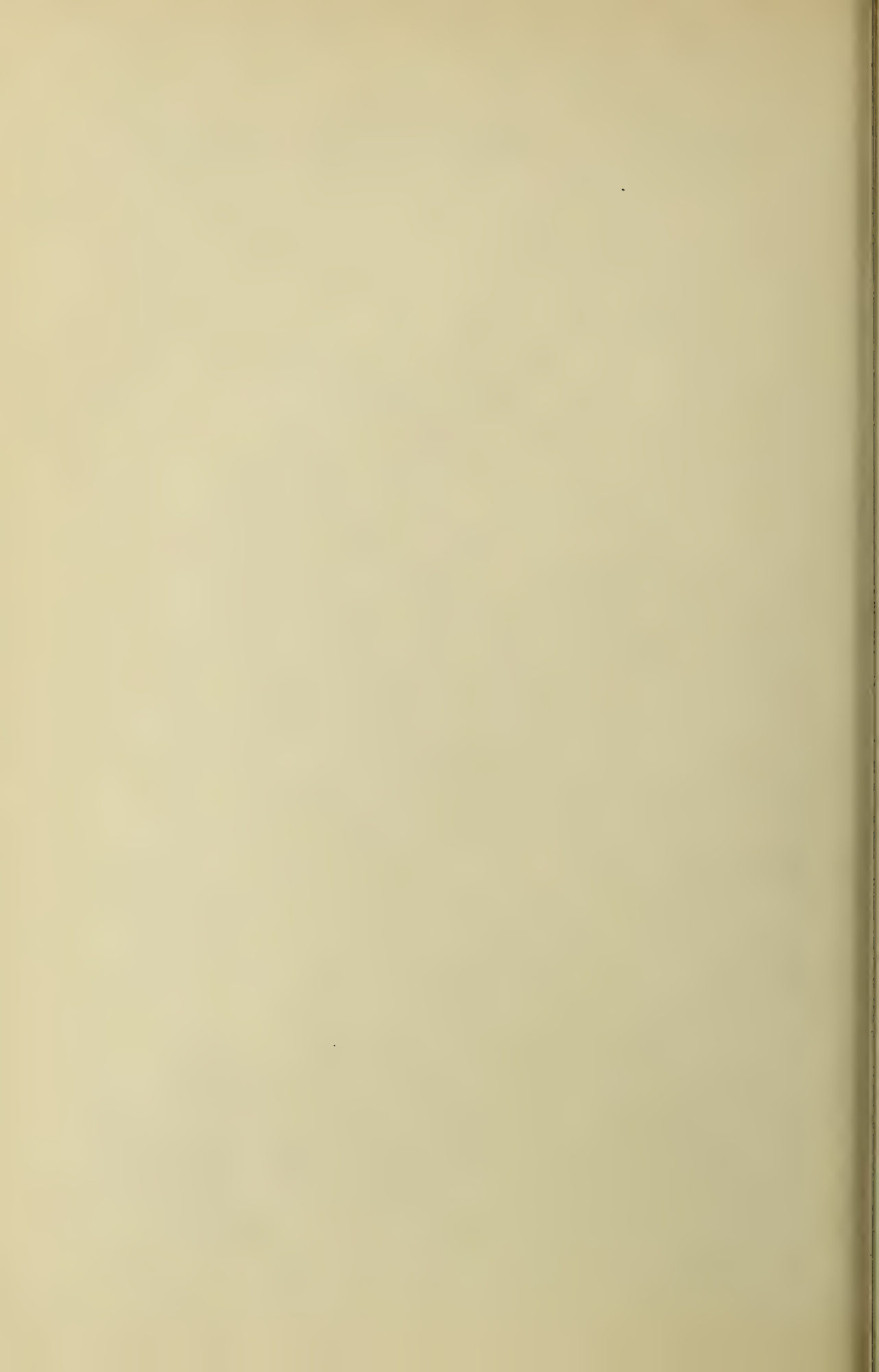


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METAL SAWING MACHINES

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Application filed August 14, 1940

My invention relates to improvements in metal sawing machines in which two vertical bow saws are provided oppositely on a vertical plane, having means which moves the saws up and down and having also means which in relation to the said upward and downward movement draw the saws nearer from the left and right when the saws are moving down and which also separates the saws when they are moving up; and the objects of my improvements are, first, to conveniently construct sawing machines which can cut metals from both sides simultaneously; second to cut off metals with the least strain on the cut face of the metals; and third to avoid forcibility which would otherwise be given to the sawing operation, whereby attaining higher sawing efficiency as compared with the like machines heretofore in force.

I attain these objects by mechanism illustrated in the accompanying drawing, in which

Figure 1 is an elevation of the metal sawing machine, the subject of my invention; Fig. 2, the back elevation; Fig. 3, a vertical section of the machine taken on the line A—A (Fig. 1); Fig. 4, a sectional plan of a part of the machine taken on line B—B (Fig. 3); Fig. 5, an elevation showing connecting pipes of oil pressure pumps and oil pressure prime motor; Fig. 6, an elevation showing the bow saws operating mechanism, excepting the machine frame and other part of the machine; Fig. 7, a side elevation corresponding to Fig. 6; Fig. 8, a magnified sectional plan of a part of the machine taken on line C—C (Fig. 6); Fig. 9, a magnified section of a part of the machine taken on line D—D (Fig. 6); Figs. 10 and 11, elevations of the apparatus shown in Fig. 3 as it appears in the last two operations; Fig. 12, a magnified section of the oil pressure regulator; Figs. 13–15, diagrammatical illustrations showing the operations of the oil pressure regulator; and Figs. 16–18, diagrammatical illustrations showing rotation of the crank corresponding respectively to the preceding three figures.

Referring to the drawings in detail, 1 (Fig. 6) are the two vertical bow saw blades provided oppositely on one vertical plane, and 2 are the bow shaped frames to which the blades are fixed at both ends. 3 (Fig. 1) are the machine frames which maintain the bow saw frames and their supporters from before and behind, and in the center of which is an opening 5 into which the material to be cut off is inserted. 6 are the bolts holding the machine frames together. 7 and 8 are respectively the receiving seat and brace which hold the cutting material therebetween at

the interior of the opening 5, and on the brace 8 are provided the oil pressure cylinder 9 and ram 10 to operate it. 2a (Fig. 6) are horizontal guide grooves prepared at the upper part, and both the front and rear sides, of the bow shaped frames 2, and 2b (Figs. 5 and 8) are the vertical guide grooves prepared at one side of the bow shaped frames. 11 is a guide block common to the left and right bow saws and is formed of two boards combined together as if to hold the bow shaped frames therebetween, having projections 11a (Fig. 9) to agree with the horizontal grooves 2a of the bow shaped frames, and by means of these projections 11a the upward and downward movement of the bow saws are not only made possible but also they serve to conduct the rightward and leftward movement of the saws. 12 are also the guide blocks provided for the left and right saws, each having a projection 12a to agree with the vertical groove 2b (Fig. 8) of the bow shaped frame, and these projections give not only the rightward and leftward movement of the saws but also serve to conduct the upward and downward movement of the saws. 12b are the horizontal guide rods secured at both front and back sides of the guide blocks 12 to be inlaid in the horizontal channels 3b prepared to the guide paths 3a (Fig. 3) of the machine frame in order not only to retain the guide blocks 12 in their position but also to conduct the rightward and leftward movement of the guide blocks. The bow shaped frames 2 and guide blocks 11 and 12 slide along the guide paths 3a of the machine frame whereby they are kept from rocking.

14 is a horizontal lever, one end 14b of which is connected to the central guide block 11 through the medium of the hanging lever 15, while the other end 14a is supported by a bearing 16 (Fig. 1) which is adjustably prepared to move along the shoulder of the machine frame 3. Namely, 14a is the supporting arbor, 14b connecting arbor of the horizontal lever with hanging lever and 15a the connecting arbor of the hanging lever with guide block, and one end of this connecting arbor 15a extending to the vertical guide slot 3c (Fig. 1), which is made in front of the machine frame, is connected to the slide piece 17 which is inserted in the said guide slot, so that the central guide block 11 is allowed the vertical movement only. 14c (Fig. 6) is the guide slot made sidelong in the lever 14 and the sliding piece 18 which is inserted into the guide slot is connected to the crank 19a of the revolving shaft 19. The said revolving shaft 19 is supported

by the bearing 20 (Fig. 3) on the machine frame and is made revolving by means of the motor 21 through the medium of gears 21, 22 and 23, pulleys 24 and 25 and belt 26 as shown in Fig. 2. Therefore by the revolving of the revolving shaft 19 the lever 14 (Fig. 6) moves up and down and consequently it imparts the upward and downward motion to both the right and left bow saws through the medium of the hanging lever 15 and guide block 11.

28 (Fig. 6) is an oil pressure cylinder fixed to the machine frames at the space above the guide block 11, having two pistons 29 therein, each piston rod 29a is connected respectively to the guide block 12 through the medium of the connecting rods 30 and vertical levers 31 which are pivoted to the fore and back machine frames at the axis 31a. Therefore simultaneously with the descending start of both saws, the pressure oil is fed in through the hole or aperture in the center of the cylinder 28 so as to push the pistons and give pressure on to both saws, while when the bow saws start ascending the pressure oil is forced out of the hole or aperture in the center of the cylinder and instead thereof the pressure oil fed in through the holes or apertures 28b at the ends of the cylinder operates on the pistons from the opposite directions giving the backward movement to the saws below.

This invention also provides means by which the edges of the saw blades are detached a little from the cut face of the material but not allowed to be detached or to retreat further when the bow saws completing sawing operation enter into backward movement, whereby avoiding the violent shake of the saws and at the same time making almost entire length of the saws perform the cutting operation efficiently. In Fig. 5, the cylinder has a high pressure oil aperture 28a in the center, and low pressure oil apertures 28b at both ends, of the cylinder which are connected respectively to the high pressure pump 34 and low pressure pump 35 through the respective pipes 32, 33 and these pumps are operated by means of proper power transmission process (which however is not illustrated in the present invention) connected with the shaft of the pulley 24.

The low pressure oil pipes 33 are connected always open to the cylinder, so that the low pressure oil being fed in to the cylinder operates the pistons but at the same time the excess oil escapes into the oil tank 36 through the safety valve 33a and pipe 33b. The high pressure oil pipe 32 is not connected direct to the high pressure oil pump 34 but the same is connected thereto through the regulator 37 and oil pipe 32a.

Referring particularly to the construction and function of the oil pressure regulator 37, in the valve chamber 37a leading to the high pressure oil pipe 32 are prepared valve seats 37b, 37c and plate valves 38, 39. The plate valve 38 is always pressed against the valve seat 37b by the spring 40, while another plate valve 39 positions a little apart from the valve seat 37c being pushed therefrom by the spring 41, in which case the central spring 42 is designed to be in the expanded state not to act on the plate valve 39. In this state of condition the high pressure oil flowing into the valve chamber 37a from the high pressure pump through the pipe 32a is, as marked by the arrows in Fig. 13, sent towards the oil pipe 32 and finally flowing into the central part of the cylinder 28 pushes the pistons forward dominating over the pressure of the counteracting

low pressure oil and gives necessary pressure to the right and left bow saws enough for their cutting operation. 43 is a safety valve which the excess oil in this case pushes open and flows out of it through the pipe 44 into the oil tank 36. By rotating the screw lid 45 the strength of the spring 46 can be changed and so the safety valve 43 serves to control the force of the oil pressure which operates on the bow saws. Further, the plate valve 38 carries through it a valve rod 38a which when pushed from outside detaches the plate valve 38 from the valve seat 37 and the inner end of the valve rod 38a collides with the other valve rod 39a of the plate valve 39 and until such collision occurs these plate valves 38, 39 stand in the state of being detached from their seats. In this case the high pressure oil, as marked by arrows in Fig. 14, flows upstream from the cylinder into the valve chamber 37a and passes together with the high pressure oil coming from the pump into the oil tank 36 through oil pipe 47, with the consequence the pressure falls so much that the pistons are pushed back by the low pressure oil in the cylinder and during such time the bow saws move back or retreat from the cut faces of the material to be cut off. However, if the inner end of the valve rod 38a pushes the other valve rod 39a, the spring 41 is compressed and the plate valve 39 is pressed on to the valve seat 37c and the pressure given henceforth to the valve rod 39a pushes the spring 42 only, as the valve rod 39a slides where the same passes loosely through the plate valve 39. On this condition the high pressure oil is hindered from flowing upstream from the cylinder, so that the pistons do not move in the cylinder and the backward movement of the bow saws stops. This backward movement of the bow saws begins when the tappet 48 (Fig. 5) pushes the projecting end secured to the left of the regulator 37 by means of the L shaped lever 49, which is operated if the cam carried by the lever revolving shaft 19 touches the roller 49a secured to one end of the said lever 49. Now, Figs. 16-18 are monogrammatical illustrations corresponding to Figs. 13-15 and show the positions where the crank pin 19b (Fig. 4) moves, in other words, Fig. 16 shows that while the high pressure oil operates on the bow saws, the crank pin 19b moves from the upper dead point A to the lower dead point B and that during this time the bow saws complete their descending stroke. Fig. 17 shows that while the low pressure oil operates on the bow saws which thereby move back or retreat, the crank pin 19b moves from the lower dead point B to the next point C, and from this it will be seen what a little space the edges of the saw blades are detached from the cut faces of the material to be cut off. Fig. 18 shows that while the bow saws are being counteracted its backward movement, the crank pin 19b returns from the point C to the original point A, and from this it will be noted that the ascending stroke of the bow saws begins already in their descending state.

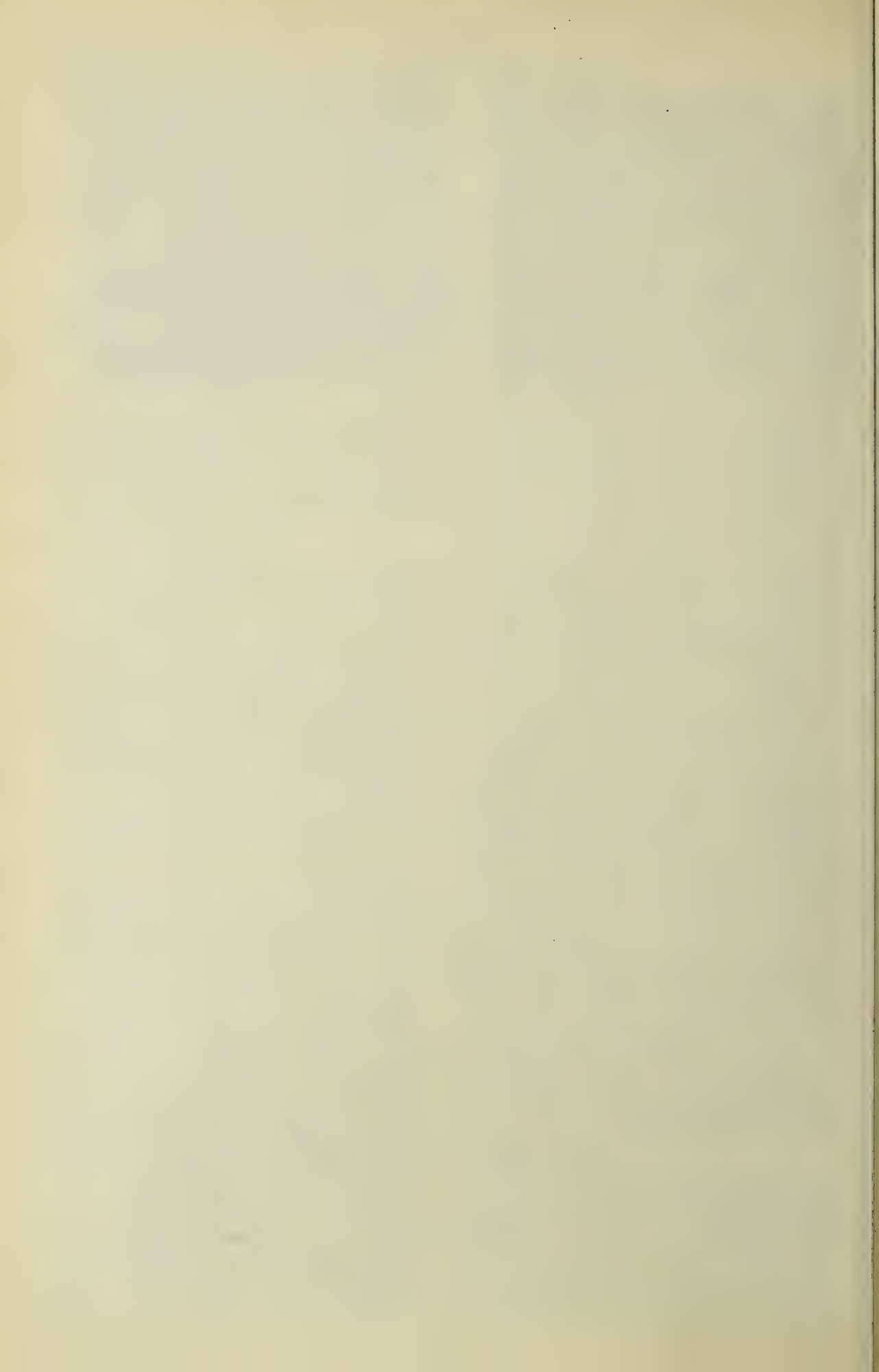
Further, the present invention provides means by which when the sawing has made good progress and both the right and left saws have attained the central part of the material to be cut off, the saws are designed to act alternately after they have come within a certain limit of contiguity, leaving always a little space between the two blades, in order that the saws may not collide with each other. For instance, as shown

in Fig. 10 and 11, the eccentric discs 51 are provided as against the upper ends of both the right and left levers 31. As these right and left eccentric discs 51 rotate on the shafts 51a entirely in an equipositional relation, when the eccentric discs are in the rotating position as shown in Fig. 10, the upper end of the left lever 31 juts out leftward and the lever pushes the left bow saw rightward without any restraint from the eccentric disc 51, while the right lever in this case is restrained from jutting out its upper end by the eccentric disc and the right saw connecting to this lever being hindered from moving forward is kept in a position for the backward movement or retreat. On the contrary, however, when the eccentric discs 51 are in the rotating position as shown in Fig. 11, the levers 31 operate entirely the other way than described above, that is, the left bow saw is hindered from moving

forward by means of the eccentric disc, while the right bow saw is allowed to move forward by such degree as required. Therefore, even when both right and left bow saws come near to the central part of the material to be cut off, the collision of them is perfectly avoided.

The gearing for these eccentric discs is, as shown in Fig. 1, that bevel wheels 52 are fixed to the shafts 51a of the eccentric discs, which bevel wheels are geared to another bevel wheel 53 secured to the horizontal shaft 54 which is supported by the bearing 55 in front of the machine frame. This horizontal shaft provides still another bevel wheel 56 which gears to the other bevel wheel 57 which is fixed to the vertical shaft 58 to the upper end of which is also secured the other bevel wheel 59 to gear to the last bevel wheel 60 fixed to the revolving shaft 19.

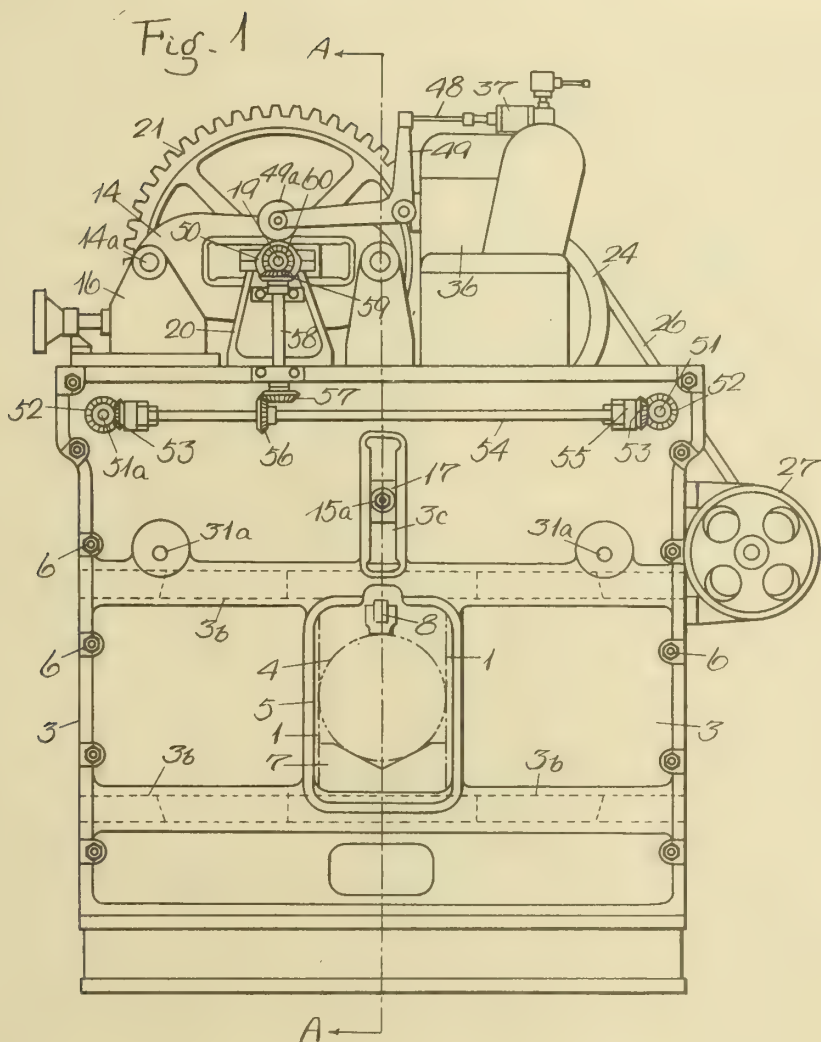
TAKAO HASEGAWA.



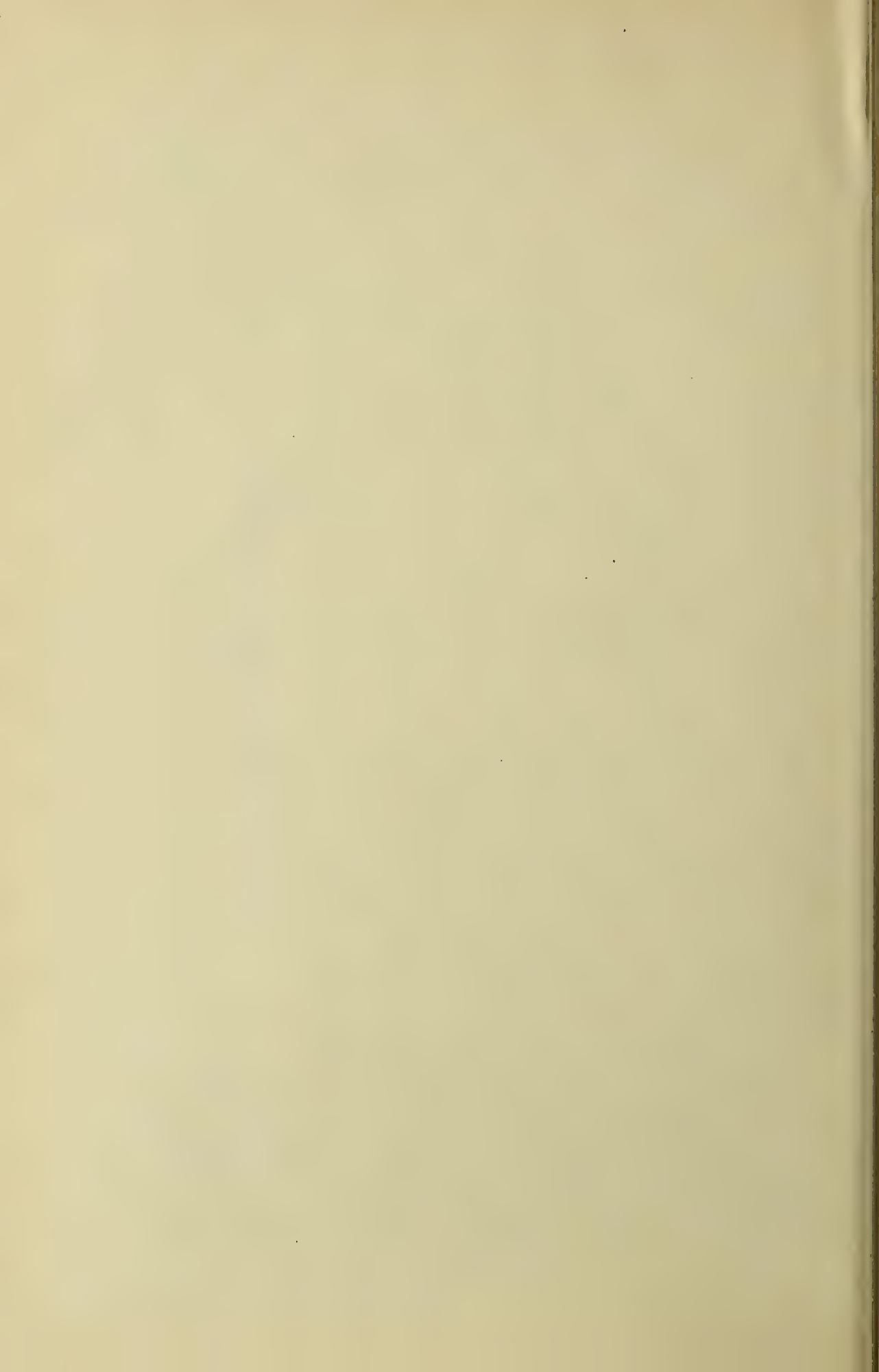
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T. HASEGAWA
METAL SAWING MACHINES
Filed Aug. 14, 1940

Serial No.
352,616
6 Sheets-Sheet 1



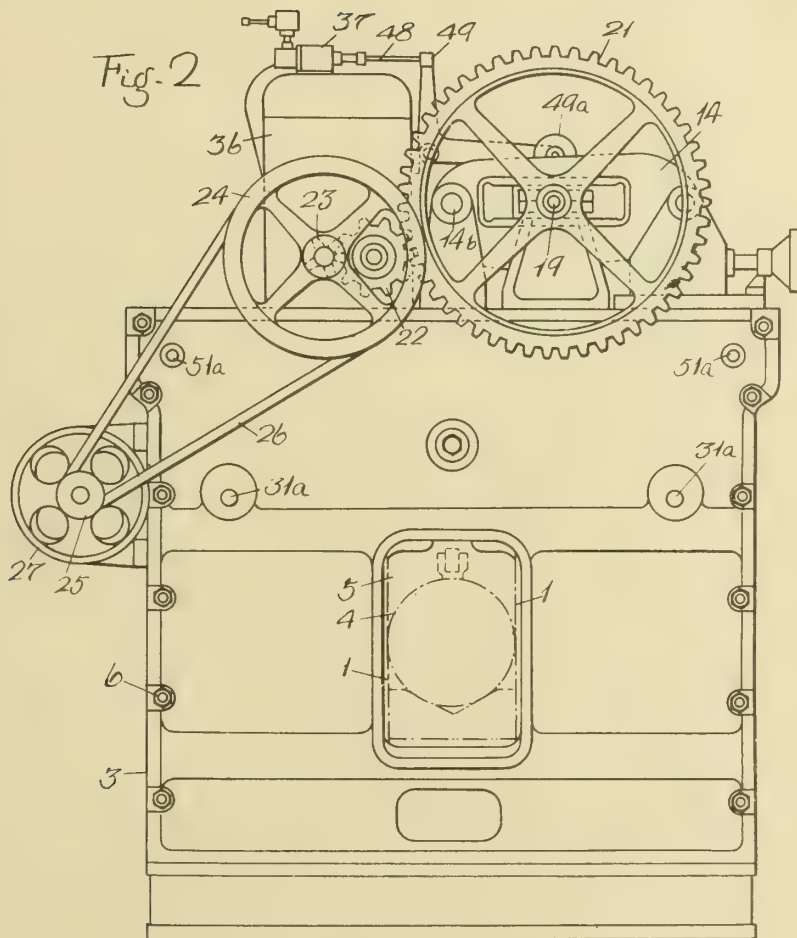
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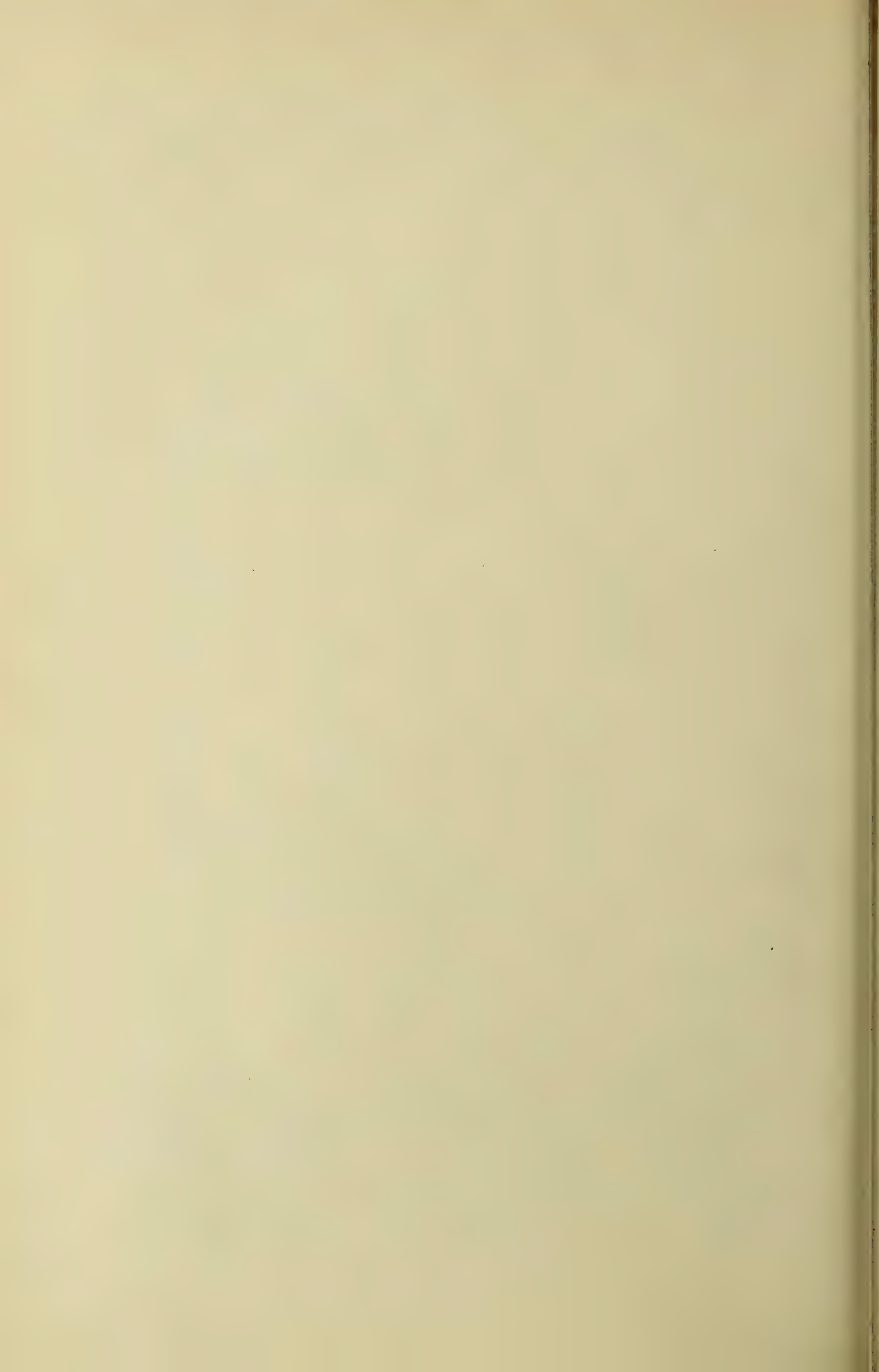
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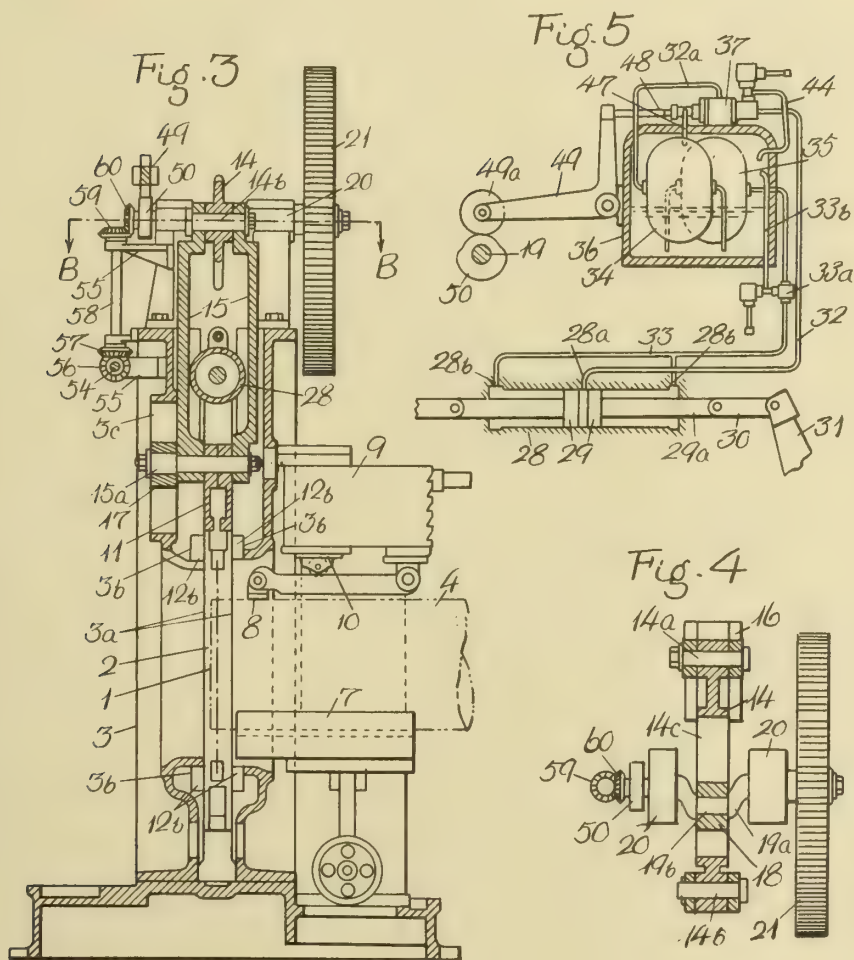
BY A. P. C.

T. HASEGAWA
METAL SAWING MACHINES

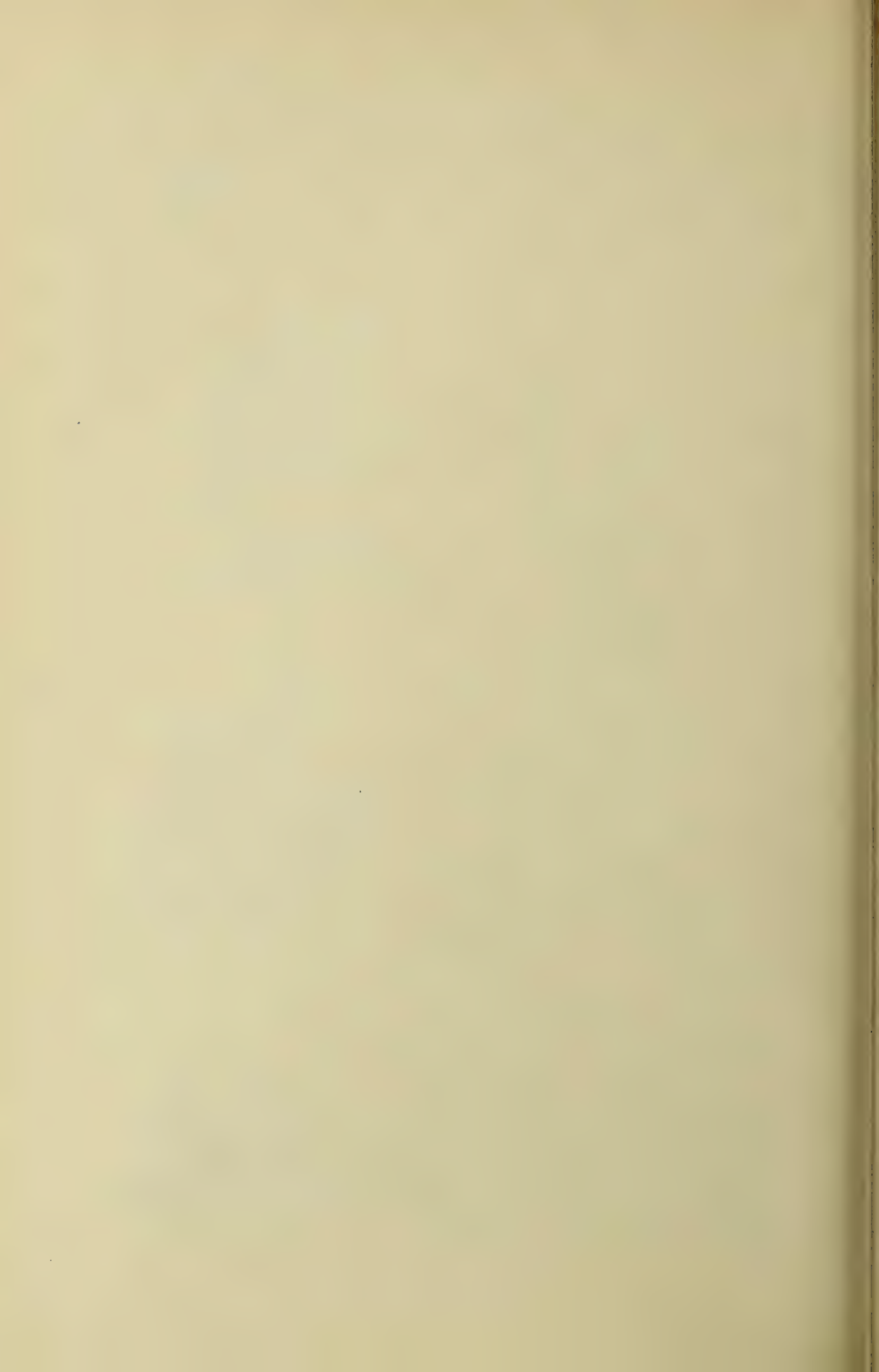
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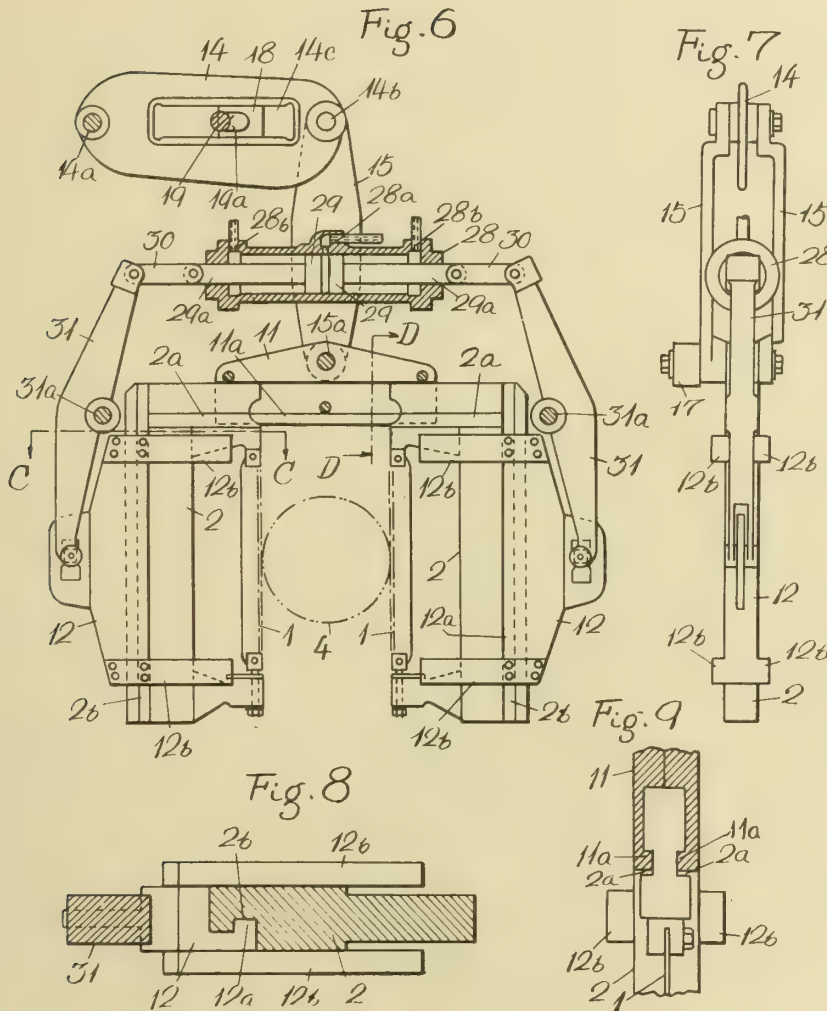
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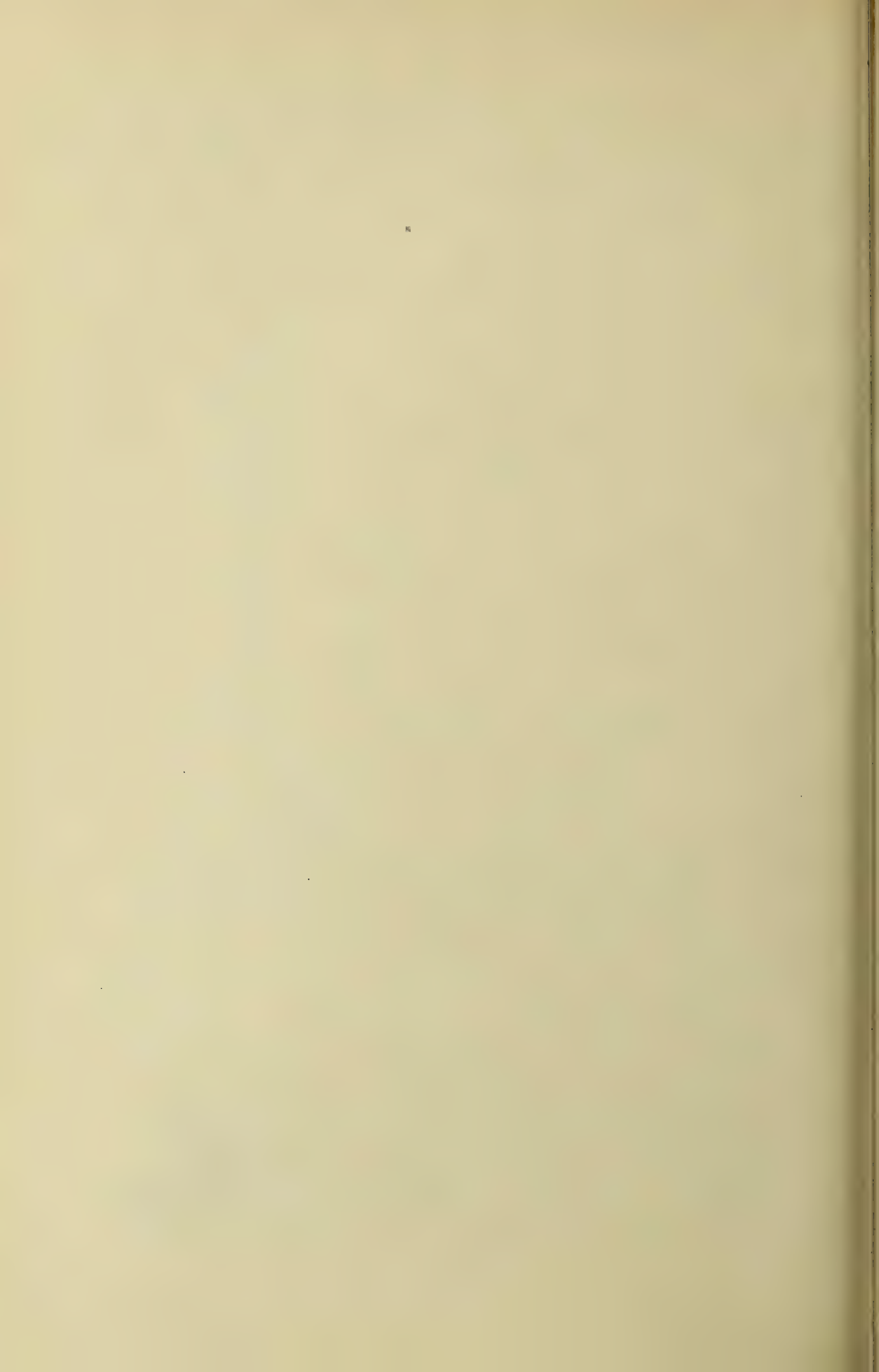


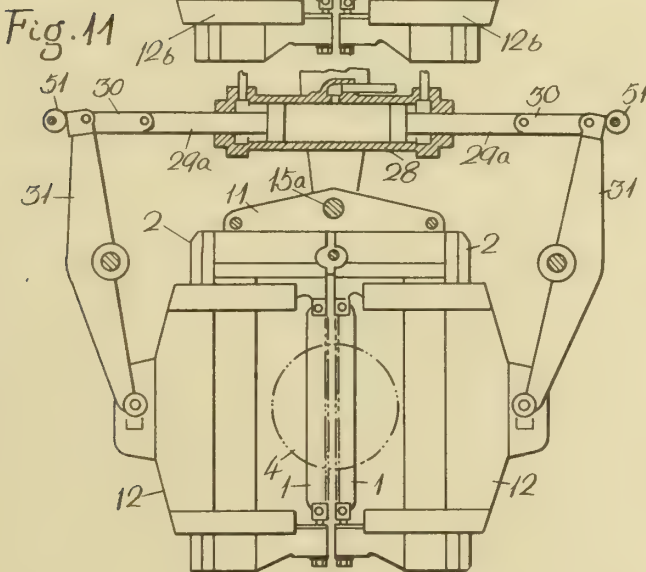
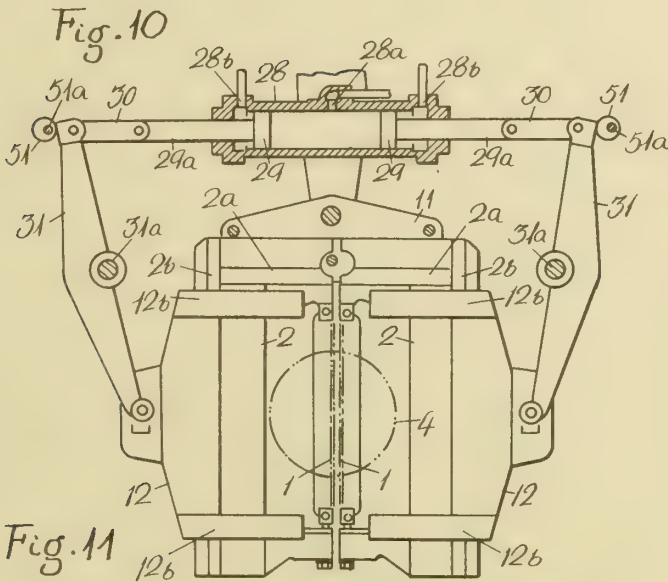
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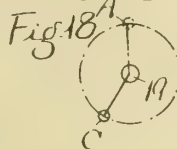
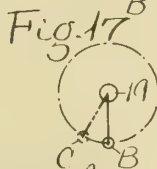
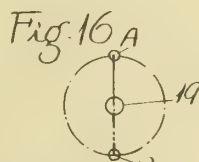
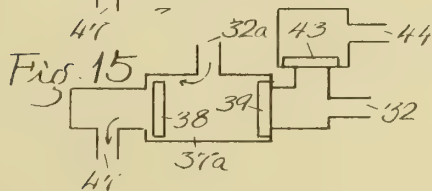
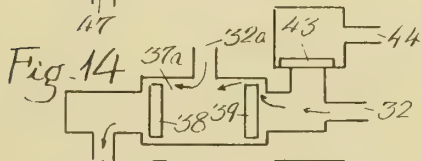
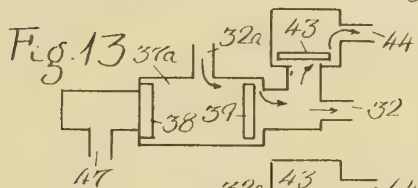
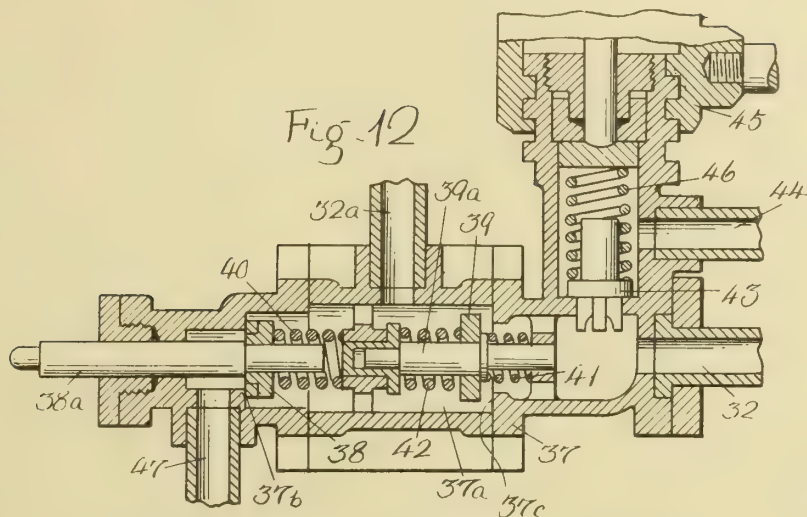


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Inventor:
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ALIEN PROPERTY CUSTODIAN

PROCESS FOR REMOVING OXYGEN OUT OF INDUSTRIAL GAS-MIXTURES

Friedrich Martin, Mulheim-Ruhr, Germany;
vested in the Alien Property Custodian

No Drawing. Application filed August 17, 1940

In industrial gases the presence of oxygen causes difficulties mainly if these gas-mixtures contain ingredients easily reacting with oxygen as for instance oxydable olefins and similar chemical compounds. Mainly at the gas storing under atmospheric or high compressed conditions these gas-mixtures may suffer an essential diminution of their value. Numerous propositions therefore are made for removing the undesired resting content of oxygen out of industrial gases by means of compounds which easily react with oxygen. For this purpose a treating with red phosphor is known. This manipulation involves however the danger that the gas mixtures are infected by pieces of phosphor. Furthermore the rest of oxygen may be removed by treating the gas-mixtures with catalytic substances at elevated temperatures. For this purpose temperatures are used, which generally depass the limit of 300° C.

Applicant had found that the whole oxygen out of industrial gas-mixtures may be removed completely at reduced temperatures by treating these gas-mixtures with finely divided metals of the eight group of the periodic system of elements. With highly activated catalysts of this manner the oxygen may be kept away already at temperatures below 200° C especially between 150-200° C.

A very high activity of the used catalysts may be caused by an addition of oxydes of the second or third group of the periodic system of elements (metals of the alkaline earths or metals of the earth). Oxydes of magnesium or thorium have found especially useful. A very fine division of the catalytic metals may for instance be attained by joint precipitation of the carbonates, oxydes or hydroxides on carriers with great inner surface as for instance on diatomaceous earth (kieselgur). Fitted for this purpose is furthermore a joint precipitation of the compounds which are to be added for increasing the catalyst-activity.

For the preparation of catalysts with high activity highly refined solutions of the metals in question (for instance Co, Ni, Fe and other metals) are necessary. Copper is very pernicious and the percentage of this metal must remain below 0.1%.

The carriers also, as for instance diatomaceous earth (kieselgur) or carbonate of magnesium, which is especially fitted for the catalysts in question are to be used in a highly refined state. The precipitated metal oxy-compounds are reduced to metals by hydrogen at a temperature ranging for instance between 300° C and higher temperatures. It is advantageous to perform the reduction by using very high layers.

FRIEDRICH MARTIN.

ALIEN PROPERTY CUSTODIAN

CASING FOR GAS TURBINES

Alfred Schütte, Augsburg, Germany; vested in
the Alien Property Custodian

Application filed August 21, 1940

This invention relates to a casing for gas turbines.

In order to operate a turbine of this class at maximum economy the actuating fluid must have a very high temperature. The part of a gas turbine subjected to greatest stresses is of course the rotor with the blades, but at high gas temperatures the casing, too, is exposed to considerable straining forces.

It is the object of the invention to provide a casing meeting all requirements by producing it from ceramic materials which possess remarkable strength even at high temperatures. The economic initial pressures of a gas turbine are as a rule quite low. They differ according to gas temperatures and partial efficiencies, but usually amount to approximately 3 to 4 atmospheres, so that in view of the resulting low stresses the casing may be made of ceramic materials without any reinforcement.

Such an arrangement is, however, open to other objections. As ceramic materials are sensitive to impact, turbine casings made therefrom can be easily damaged by action from without. Furthermore, the outside of the turbine casing, due to the high gas temperatures prevailing inside, will acquire a relatively high temperature, and the radiation of heat will therefore be considerable, unless the casing is carefully insulated.

In further accordance with the invention the ceramic turbine casing is therefore surrounded by two or more steel jackets, and the hollow spaces formed between the jackets and the casing are flown through, in particular order, by a portion of the air supplied by the compressor to the combustion chamber. A casing of this type is fully suited for economically operating turbines with gases of high temperature.

One form of the invention is illustrated by way of example in the accompanying drawing which shows a longitudinal section of a casing according to the invention.

A drum rotor 1 provided with moving blades 2 is supported by a shaft 4 by means of interposed tubes 3. Vanes or guide blades 5 are disposed in a casing 6 made of ceramic material. The actuating gas enters the turbine through a

connection 7 and passes out through a connection 8. The casing 6 is surrounded at a certain distance by a protective jacket 9 of heat resistant steel which is enclosed by a second jacket 10 of structural steel. Between the casing 6 and the first jacket 9 as well as between the jackets 9 and 10 ribs, not shown, may be arranged so that contact is made only at a few points to interfere with heat conduction from the casing to the outside, whilst, on the other hand, the casing and its protective jackets are reinforced.

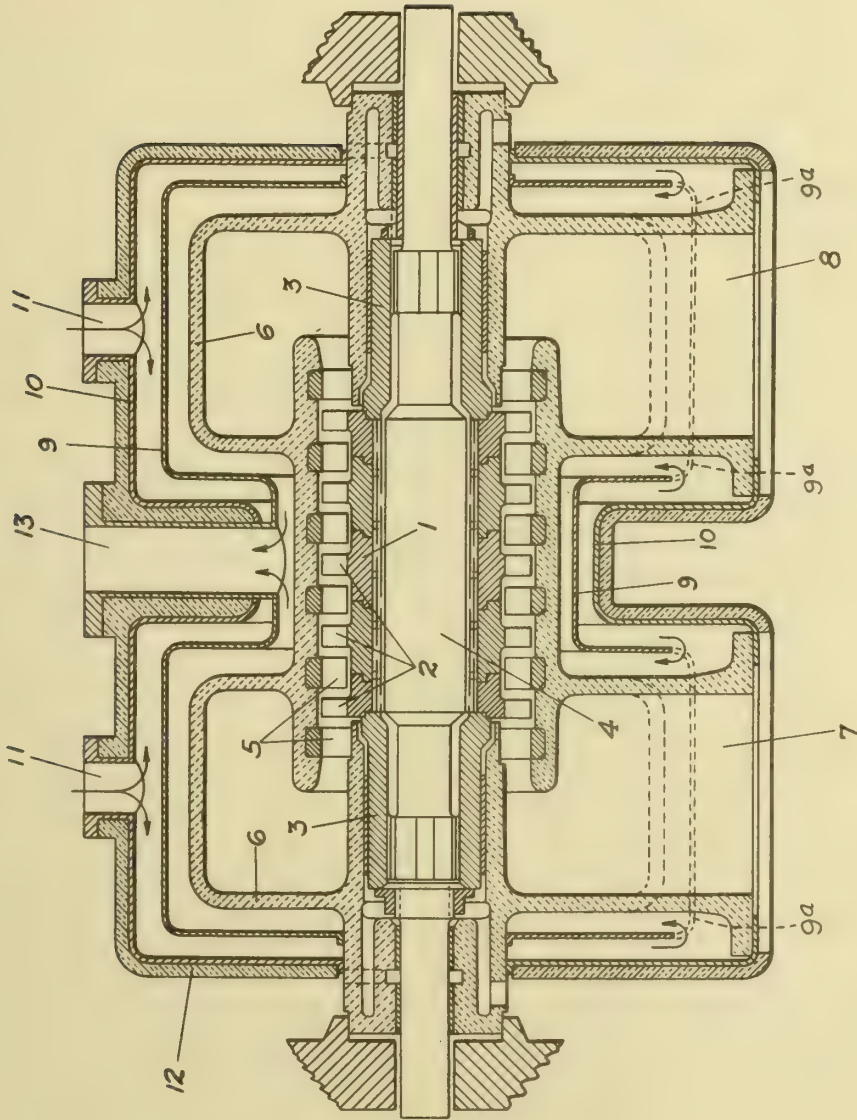
The portion of compressed air intended for cooling the casing 6 is guided through connections 11 into the hollow space formed between the jacket 10 and jacket 9 and then enters the space between the jacket 9 and the casing 6. In this way, the coldest air will be found at the outer circumference of the turbine, heat radiation kept down, and only preheated air will flow past the casing 6. This arrangement prevents, moreover, excessive cooling of the casing 6 and the development of dangerous thermal stresses resulting therefrom. The outer steel jacket 10 acquires only a low external temperature, and a relatively slight and low-priced insulating layer 12 will therefore suffice for reducing heat losses to a minimum. The cooling air heated in the turbine passes out through a connection 13 and between the compressor and the combustion chamber of the turbine plant is returned to the air current for combustion at a point where equality of pressure prevails between this partial air current coming from the enclosure of the turbine casing and the main air current flowing from the compressor through an air preheater to the combustion chamber. This is possible without trouble, because both the main and the partial air current suffer a loss in pressure, the first one in the preheater and the other one in the jackets of the casing. The partial air current is therefore admitted at a point where the drop in pressure from the condenser to this point is equal to the drop in pressure occurring in the jackets of the casing, the cross sections and quantity of the partial air current being so dimensioned that, as much as possible, equal temperatures prevail also at the admission point.

ALFRED SCHÜTTE.

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A. SCHÜTTE
CASING FOR GAS TURBINES
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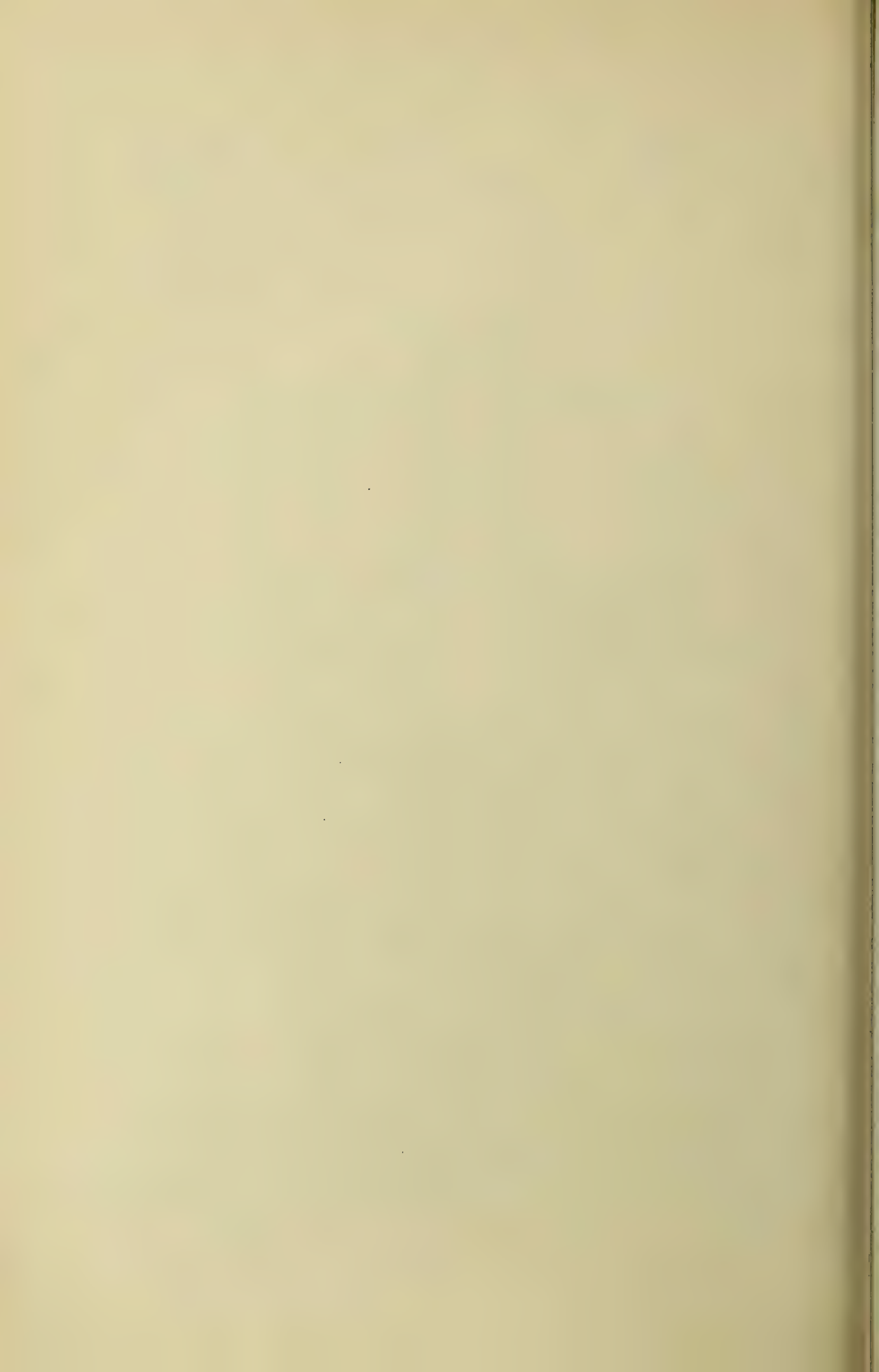


Inventor

Alfred Schütte

By *Maréchal & Noi*

Attorney



ALIEN PROPERTY CUSTODIAN

SCREW GAUGE

Richard Wildermuth, Stuttgart-Bad-Cannstatt,
Germany; vested in the Alien Property Custodian

Application filed August 22, 1940

My invention relates to a screw gauge provided with calipers which are formed in the manner of a backsight and foresight so that the projecting points or tips of these backsight-like and foresight-like members are adapted to enter into the threads of a threaded body to be measured.

It is an object of my invention to provide an improved screw gauge of this kind.

According to my invention the bow of the screw gauge is provided with an exchangeable backsight-like member, which can rigidly be fixed to the bow, and with a displaceable foresight-like member. These two members serve for catching in the threads of the piece of work to be measured. On the other hand the bow is provided with a measuring beam which is arranged for influencing the position of said displaceable foresight-like member and which is provided with an exchangeable tolerance-body, for instance a tolerance ledge or a tolerance thimble.

By providing the screw gauge with an exchangeable tolerance body I attain the advantage that various thread-diameters and kinds of thread can be measured with a single gauge, while in connection with the exchangeable tolerance-body the real measure or size as well as the allowed amount of variation can be determined or measured.

In the drawings affixed to this specification and forming part thereof some embodiments of my invention are illustrated diagrammatically by way of example.

In the drawings

Fig. 1 is a front view of a screw gauge according to the invention, partly in section, while

Fig. 2 is an elevation of this gauge.

Fig. 3 shows the backsight on a larger scale,

Fig. 4 is a front view of the backsight according to Fig. 3,

Fig. 5 is a sectional view along line A—B of Fig. 2 on a larger scale, while

Fig. 6 is a similar section of another modification.

Fig. 7 shows the tolerance thimble used in the modification illustrated in Fig. 6.

Referring to the drawings and first to Figs. 1-5, the screw gauge consists of the following parts which are necessary for a full understanding of the subject matter of the invention, viz. of a bow 1, a backsight-like member 2, a foresight-like member 3 and an outer box 4 to which the bow 1 is fixed with the aid of the set screw 5. The bow 1 is provided with a supporting pin 6 which is arranged in bow 1 free for displacement and which can be fixed by means of a clamping

screw 7. On unscrewing clamping screw 7, the supporting pin 6 can be adjusted and it serves thus as support or rest for the piece of work to be measured which is shown in Figs. 1 and 2 by dot and dash lines.

When the set screw 5 is unscrewed, the outer box 4 arranged in bow 1 can be displaced in longitudinal direction and adjusted and locked. In this outer box 4 is arranged a bearing 8 for supporting the foresight 3. This bearing 8 can be displaced by means of the measuring beam 9, which cooperates with a device which is arranged in the handle 10 and does not form a subject matter of the present invention.

On the measuring beam 9 is arranged a tolerance-body which according to the modification shown in Figs. 1, 2 and 5 consists of a tolerance ledge 11 resting in a recess 12 of the measuring beam 9, as illustrated in Fig. 5. When the tolerance ledge 11 shall be inserted, a cap 13 formed as a screw is unscrewed for instance with the aid of a wrench 14 shown in Fig. 1 by dot and dash lines; the tolerance ledge 11 is thereupon inserted in the recess 12 and attached to measuring beam 9 by again screwing on cap 13.

Before a threaded body 15, the thread of which shall be measured, is inserted in the gauge, the measuring beam 9 is forced into the lefthand end position shown in Fig. 1 by pressing against the cap 13. The threaded body 15 is thereafter inserted so as to rest on the supporting pin 6. Now the measuring beam 9 is released and under the influence of a spring arranged in the handle 10 is shifted towards the righthand side out of the handle 10; this position is shown in Fig. 2. While the body 15 to be measured lies between the backsight 2 and the foresight 3 with a very small clearance when the measuring beam 9 is pressed in (Fig. 1), the piece of work 15 is fairly caught on either side by the backsight 2 and the foresight 3, when the measuring beam 9 is shifted out. The measure of the piece of work and its situation with regard to the tolerance field 14 and to the zero line can be read from the resulting position of the measuring beam 9 and the tolerance ledge 11, respectively. The graduated field on the tolerance ledge 11 cooperates with mark 16. The predetermined measure is attained if the zero mark of the tolerance ledge 11 coincides with the mark 16.

After the tolerance ledge 11 being removed, a tolerance ledge 11 with a different graduation or with a different range of tolerance can be inserted in the recess 12, so that a single screw gauge in

combination with several various tolerance ledges results in a great number of gauges.

According to the modification shown in Figs. 5 and 6 the tolerance-body consists, instead of a tolerance ledge 11, of a tolerance thimble 17 which is arranged free for exchange on a measuring beam 18 in a similar manner as the tolerance ledge 11, viz. with the use of a cap screw 13.

The tolerance thimble 17 shows for instance four scales on its surface. Three of these scales 19, 20 and 21 can be seen in Fig. 7, while the fourth scale 22 is situated on the rear side of the tolerance thimble 17. To this end the tolerance thimble 17 is provided with a number of grooves 23 or indentations, to which a rigid wedge 24 is coordinated as guiding member. The tolerance thimble 17 can be removed when the cap screw 13 has been unscrewed. If a different tolerance shall be employed, the removed tolerance thimble 17 is turned by a corresponding amount and

again shifted on the measuring beam 18, i. e. with a groove 23 on the wedge 24, whereupon the cap 13 is screwed on, so that the gauge is now adjusted to a different tolerance.

Apart therefrom the screw gauge provided with a tolerance thimble 17 may be handled in the same manner as described with reference to the first example. Both modifications make use of a backsight 2 and a foresight 3 which are shown in Figs. 3 and 4 on a larger scale. Backsight and foresight are formed as bolts 25 and 26, and the backsight 2 or its bolt 25 is arranged in a bearing 27 of bow 1, while the foresight rests in the bearing 8. Backsight 2 and foresight 3 are each provided with a pin 28 which secures their positions.

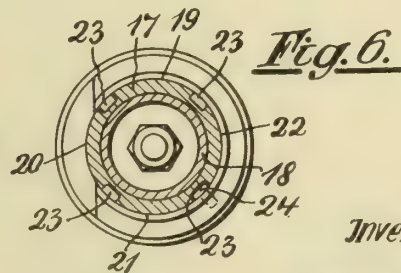
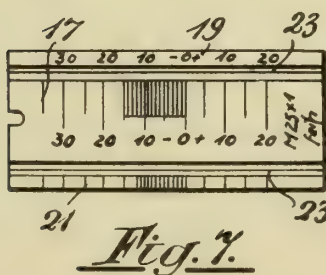
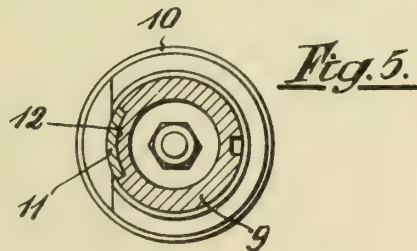
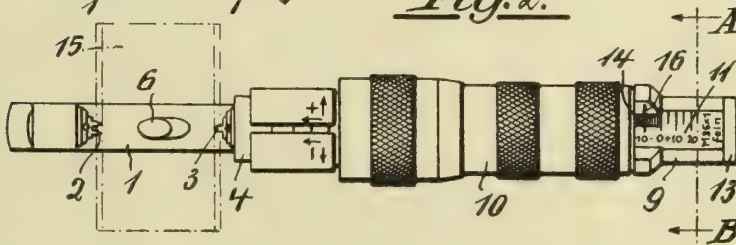
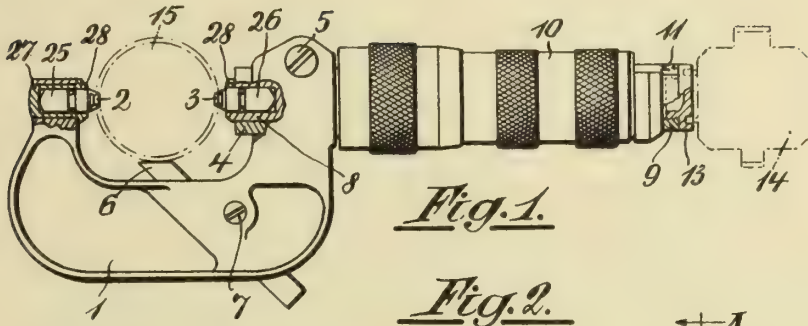
I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

R. WILDERMUTH.

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BY A. P. C.

R. WILDERMUTH
SCREW GAUGE
Filed Aug. 22, 1940

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353,760



Inventor
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ALIEN PROPERTY CUSTODIAN

TRACKS FOR TOY VEHICLES

Ernst Horn, Nurnberg, Germany; vested in the
Alien Property Custodian

Application filed August 23, 1940

This invention relates to tracks for toy vehicles, such as toy automobiles, and has for its principal object to devise a track of this kind which is adapted to serve for toy vehicles of which one is overtaking the other, said vehicles including deflecting devices in the form of a push-rod mounted swingeably about a fixed point of each vehicle and adapted to deflect the vehicle travelling at higher speed from its direction of travel, when overtaking another which is travelling at smaller speed in front of the same. In order to again carry the vehicle, after having overtaken the other, towards the elevated rim of the track, the latter is inclined in direction to the right-hand side with respect to the direction of travel.

An arrangement of this kind is disclosed and claimed in a co-pending application for U. S. Patent, filed by Walter Minner of Erfurt, Germany.

According to my invention, now, the aforementioned track and toy vehicles are arranged in a novel manner permitting the vehicles of being driven at varying speed, so that they may alternately overtake each other in such a manner that at a time the one vehicle will be in front and at some other time in the rear of the other vehicle. By this novel arrangement there is created the impression of an automobile race in which case the automobiles alternately overtake one another.

In order to attain alternately varying speeds of the vehicles, according to my invention each vehicle is further provided with a switching device which is automatically controlled by the motion of the drive and acts onto the axle of the speed regulator. This switching device may, for instance, consist of a resiliently mounted lever, preferably a double-armed lever, controlled by a cam-shaft fast on the winding-up axle of the clockwork driving the vehicle, said lever forming a bearing for said axle and disengaging the latter from the drive, with the result that the clockwork will run off more rapidly.

In the accompanying drawing I have represented an example of the track and the vehicles constructed in accordance with my invention. In the drawing, Fig. 1 is a side-view of the carriage of a vehicle together with the clockwork driving the same, Fig. 2 a plan-view taken on Fig. 1, Figs. 3 and 4 are views showing details of the construction, Fig. 5 is a partly broken-away top-view of the two vehicles at the moment before overtaking on a straight track and Fig. 6 a similar view of the two vehicles at the moment before overtaking on a curved track.

the vehicle is driven by a clockwork including a spring *c* which may be wound-up by means of the winding-up axle *l* mounted rotatably in the frame *m* of the clockwork. The rear axle *b* is being driven by the spring *c* in known manner by way of an intermediate train of gear-wheels and pinions. The rear axle may be rotated at a smaller or greater speed, when the regulator axle *q* is disengaged from or engaged with the clockwork, respectively. Said regulator axle *q* is mounted at the end of a double-armed lever *p*, which on its part is mounted swingeably about the axle *o*. The latter is mounted within the frame of the clockwork. The other end of said double-armed lever *p* is controlled by means of a cam-shaft *n*, said lever being pressed by action of a spring against the periphery of said cam-shaft. The speed regulator axle *q* will be engaged with the clockwork, as shown in Fig. 3 and, accordingly, the vehicle will travel at a smaller speed, as long as the end of said double-armed lever *p* is resting on the part of the periphery of said cam-disk with the smaller diameter. On the other hand, the speed regulator axle *q* will be disengaged from the clockwork and the latter, accordingly, rotate at a time at a smaller and at some other time at a greater speed, when the cam-disk *n* is rotating with the winding-up axle *l* by action of the spring and when the left-hand arm of the double-armed lever *p* rests on the part of the periphery of the cam-disk with the greater diameter.

As shown in Fig. 5, in which case the vehicles are in condition just before overtaking on a straight track, the fixed push-rod *g* provided in front of the rear vehicle *f* will abut against the swingeable push-rod *e* provided in the rear of the front vehicle *d*.

In condition of overtaking of the vehicles on a curved track as shown in Fig. 6, the longitudinal axes of the two vehicles form an angle with each other and, accordingly, the swingeable lever *e* at the end of the front vehicle *d* is not given a swinging motion, but pressed towards the right-hand side, when the push-rod *g* of the rear vehicle *f* is abutting against the swingeable lever *e* at the rear end of the front vehicle *d*.

Preferably, the cam-disks *n* on the winding-up axles for the clockworks of the vehicles are displaced against each other by an angle of about ninety degrees, with the result that the two vehicles will be travelling at different speeds. The two vehicles, accordingly, will alternately overtake each other, the cause proper for such alter-

Referring more particularly to the drawing, 55

nate overtaking being not cognisable to the observer.

The movable deflecting organ may be provided at the rear end and the fixed deflecting organ at the front end of each vehicle, the same as in the construction forming part of the aforementioned co-pending application. However, the said deflecting organs may also be arranged in the opposite way, that is the movable deflecting organ may be provided at the front end and the fixed deflecting organ at the rear end of the vehicle. In every case the movable deflecting

organ is mounted with its arm e' swingeably about the point i and will be kept in position of rest by means of a spring h . On the other hand, the fixed deflecting organ is preferably inclined or provided with an elevated part, so that during co-operating with the movable deflecting organ of a second vehicle travelling in front of another vehicle the lateral deflection of the vehicle travelling in the rear, when overtaking the vehicle travelling in front, may be performed with a minimum of friction or other obstruction.

ERNST HORN.

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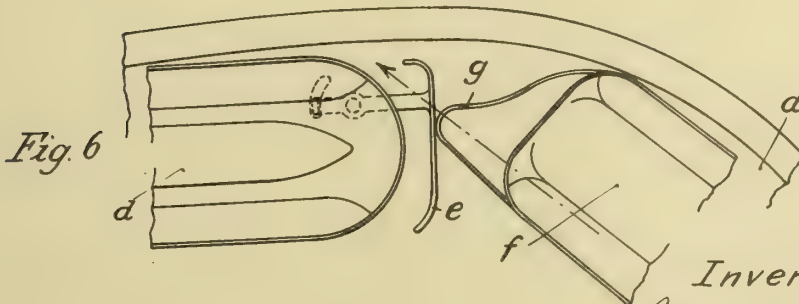
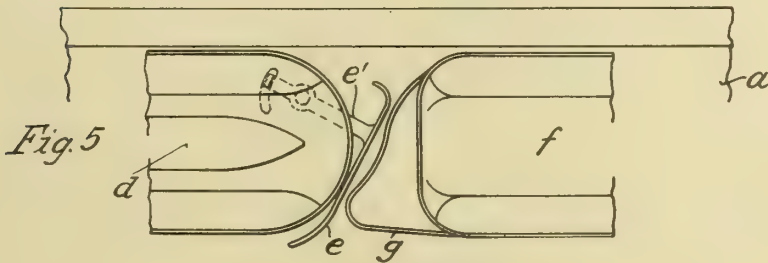
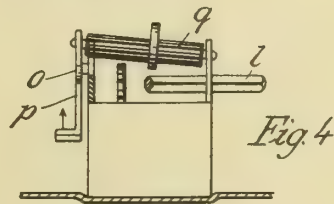
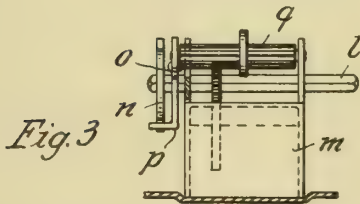
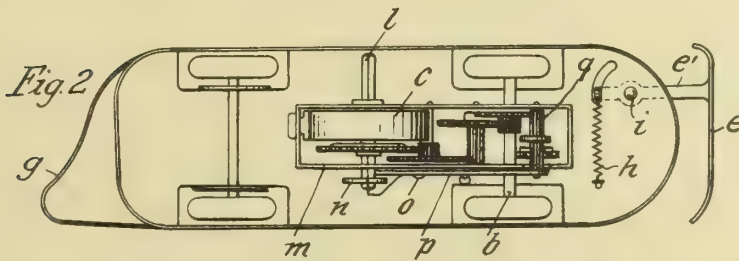
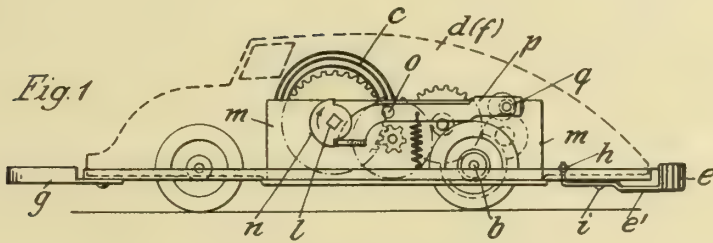
E. HORN

TRACKS FOR TOY VEHICLES

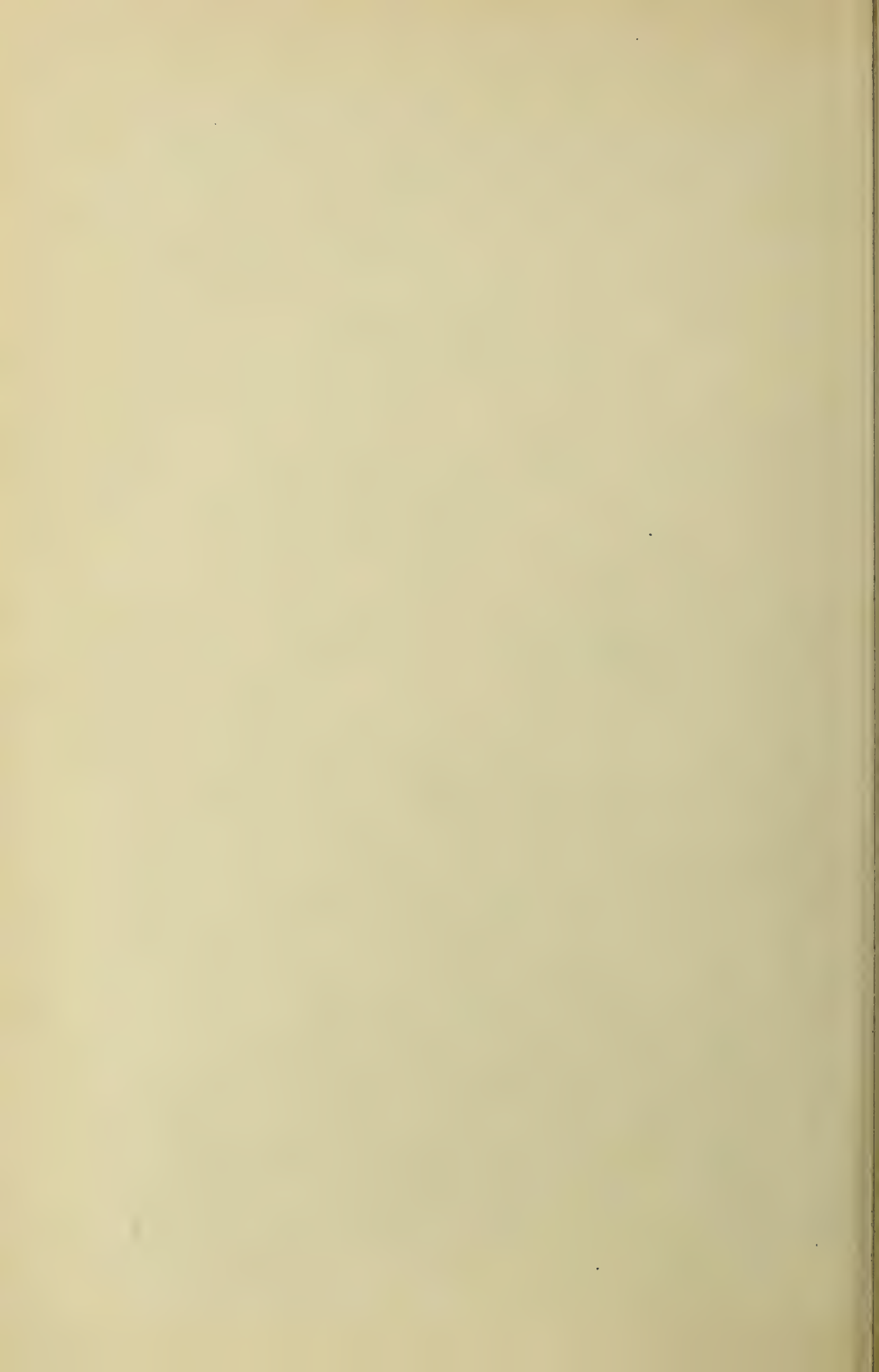
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Inventor:
Ernst Horn,
by Frank S. Appleman,
attorney.



ALIEN PROPERTY CUSTODIAN

MUTUAL PRECIPITATION OF POLYAMIDES AND CELLULOSE

Kurt Thinius, Eilenburg, Germany; vested in the
Alien Property Custodian

No Drawing. Application filed August 24, 1940

This invention relates to the production of mixed structures, foils, filaments, films consisting of polyamides and cellulose or cellulose derivatives.

The so called polyamides being high polymeric compounds are obtained by polycondensation of bifunctional compounds, for instance by polycondensation of ω -amino carboxylic acids with more than five carbon atoms between the amino- and carboxyl groups or their amide forming derivatives, furthermore by polycondensation of $\alpha\omega$ -diamines with four and more atoms between the two amino groups and dicarboxylic acids or their functional derivatives, such as esters, acid chlorides, lactams, urethanes, $\alpha\omega$ -dihalogen hydrocarbons. Their properties in regard to solubility make it difficult to work them up in the usual way by dissolving them in organic solvents at ordinary or slightly increased temperature. It is possible to form the polyamides thermically, on account of the high temperatures, however, this is connected with many technical difficulties. Moreover, it was found necessary to give a further treatment to the structures, films, foils or filaments thus obtained, in order to attain maximal mechanical properties. This can either consist in a cold drawing process (in two directions vertical to each other) which is always connected with a change in the thickness of the structures, or in a further heat treatment at temperatures above 180°C. All these additional measurements render the working-up process more difficult.

It is an object of the present invention to produce mixed structures, foils, films, filaments and the like.

A further object is to manufacture said structures from polyamides and cellulose.

Still another object is to produce these structures from polyamides and cellulose derivatives.

These and other objects will become apparent from the following description.

These aforementioned disadvantages can be eliminated when the polyamides are worked up together with cellulose or its derivatives being soluble in alkaline media. This is accomplished by the following process. The polyamides are dissolved in acid mediums of at least six-times normality, whereupon, these solutions are precipitated by an alkaline medium of a dissolved cellulose or cellulose derivative, if necessary after filtration. The polyamide and the cellulose particles are hereby homogeneously mixed with each other and give a mixed structure of excellent properties. The mixed structures consisting of cellulose or cellulose derivatives have compared

with the pure polyamide structures the advantage of showing their maximal mechanical properties immediately after the removal of the liquid, so that the following heat treatment, as mentioned above, is not necessary anymore. This means a considerable technical progress. Furthermore it must be mentioned that the high absorption of water of for instance 8-20% according to time and temperature, which is characteristic for the polyamides, has decreased considerably in the mixed structures obtained according to the present invention. Whereas the high sensitivity against water limits considerably the field of application for the polyamides, the mixed structures consisting of polyamides and cellulose or cellulose derivatives are useful wherever other water-repellent substances have been applied.

As seen from the side of the cellulose or its derivatives the mixed structures with polyamide have the advantage of increased flexibility, higher stability on heating and better dyeing characteristics. The following examples may further exemplify the present invention.

Example I

For the manufacture of a mixed structure in the form of a film consisting of polyamide and cellulose glycolic acid there are dissolved 20 parts of polyamide of a medium degree of condensation corresponding to a K-value of about 35 (in regard to K-value see Cellulosechemie 13,73 by Fikentscher) in 6 N aqueous hydrochloric acid. This is precipitated through a large slot in a precipitating bath consisting of a solution of 10 parts cellulose sodium glycolate in 80 parts 6 N caustic soda. The precipitating bath flows to the polyamide solution preferably in a counter-current. The film obtained on the place of the entry consists of polyamide and cellulose glycolic acid. The proportion of the two constituents is determined by the proportion of the alkaline cellulose glycolic acid solution to the polyamide solution. If a mixed film being rich on polyamide is desired, the alkaline precipitating bath will be used in a normality smaller than 6 N. It is also possible to dilute carefully the acid polyamide solution up to about $\frac{1}{3}$ of its volume with water and to work it up into mixed films by means of cellulose glycolic acid as described above. Also the reverse working process, namely to precipitate the cellulose derivative in a precipitating bath consisting of a polyamide solution is possible.

Example II

A polyamide solution according to Example I

flows through the inner part of a double-tube and meets at the opening a cellulose solution in ammoniacal copper oxide. A mixed filament consisting of polyamide and cellulose is obtained. The mixed filament, the shape of which depends on the form of the double-tube or of the nozzles is characterized compared with the pure polyamide filament by an increased stability against water even then when the cellulose portion remains below that of the polyamide. The manufacture of a mixed structure, for instance in the form of foils, may be accomplished also in the following manner: The openings of the polyamide solution and of the alkaline solutions of cellulose or cellulose derivatives being right close to each other are conducted in water or in 2-4 times n hydrochloric acid in such a manner, that mixing of the solutions and consequently formation of a mixed film occurs.

Instead of the ammoniacal copper oxide-cellulose solution a solution of the cellulose ethers or of the ether carboxylic acids or of other derivatives of the cellulose being soluble in alkali may be used. Also mixtures of these solutions may be employed as precipitating baths. To make use of different polyamides is also possible. By changing the dose of the polyamide solution or of the alkaline cellulose solution there is a chance of varying extensively the composition of the mixed structures. In this way there can be obtained for instance filaments which are of different composition in different zones. On account of the different dyeing characteristics novelty effects on such fabrics and knitted articles can be obtained.

KURT THINIUS.

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE DEHYDRATION AND CALCINATION OF POTASH ALUM

Gino Gallo, Pisa, Italy; vested in the Alien
Property Custodian

No Drawing. Application filed September 7, 1940

It is known that potash alum in crystals with 24 molecules of water and containing 45.56% of water, when subjected to heat melts rapidly at 92°C in its water of crystallization, giving origin to a most mobile liquid which, with the rising of temperature, becomes gradually viscid and forms a sticky mass difficult to handle. With a further rise of temperature, the parts nearer to the heated surface dry up and become a porous or spongy mass which constitutes the ordinary burnt alum. Finally, at about 500°, the sulphate of aluminium begins to dissociate into oxide of aluminium and sulphuric-sulphurous anhydride, till at a temperature of about 1000°C. the dissociation is complete and there remains only a mixture of potassium sulphate and of aluminium oxide.

In numerous experiment made in connection with the present invention, it has been noted that during this last period there is formed, as an intermediate product, also certain quantity of potassium bisulphate, which, owing to its low melting point (about 200°C.) flows rapidly out of the porous mass of alum and is absorbed by the refractory material. This phenomenon is due as was already proved by the inventor, to the fact that the alum, a very bad conductor of heat, withholds strongly in the internal part of its mass a certain quantity of water of crystallization and, when the temperature of the external mass reaches the point of dissociation of the aluminium sulphate and there begins to form sulphuric anhydride, the latter, in contact with the water still present in its interior causes the formation of sulphuric acid, which, with the potassium sulphate with which it comes into close contact, forms potassium bisulphate easy to melt.

All those facts partly known and partly investigated into and explained by the inventor render particularly difficult and complicated the calcination of big masses of potash alum on an industrial scale.

The present invention purports to overcome such difficulties and has for its object a new process for the dehydration and the calcination of potash alum, which allows of the industrial calcination of big masses of said alum.

In relation to the previous Italian Patent No. 351.651, the potash alum may be obtained in most minute crystals by provoking its crystallization in a stirring apparatus.

Such minute crystals are, under this process, subjected to drying at a temperature of 75°C., in an air current within a mixing apparatus. In consequence of the drying they lose about 30% of water within the space of 5 to 6 hours, whereby they are transformed into the salt with 6 molecules of water of crystallization, which salt, while maintaining its powdery structure, no longer melts at 92°C.

The salt may, therefore, be subsequently heated for a period of 2 to 3 hours, at a temperature of 250-300°C., in a current of air so as to obtain the complete dehydration of the alum. Also this operation, as the preceding one, is carried out by stirring the material so as to make it maintain its initial structure of loose powder and to facilitate the complete dehydration of the alum.

The anhydrous alum is then brought up to a gradually increasing temperature until it reaches 800-850° in a period of 6 to 8 hours, the material being continuously stirred in a muffle, while provision is made for the suction of the sulphureous gases in order to facilitate the dissociation of the aluminium sulphate.

During all these successive operations the material retains its structure of loose powder, and thus are facilitated both the dehydration of the alum and the dissociation of the aluminium sulphate.

GINO GALLO.

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE MANUFACTURE OF CIGARETTE PAPER

Wilhelm Gärtner, Darmstadt, Germany; vested
in the Alien Property Custodian

No Drawing. Application filed September 9, 1940

This invention relates to the treatment of flax and hemp refuses for the manufacture of cigarette papers. More particularly, it relates to the removal incrustations of the refuses.

As raw material for the manufacture of cigarette papers flax and hemp refuses from the spinning mills are often used. These fibres, however, contain considerable quantities of strongly colored incrustations. These incrustations are very objectionable as the cigarette papers require a uniform whiteness. Furthermore, these strongly lignified incrustations influence the qualities and appearance of the cigarette papers in a very unfavorable sense.

In order to remove the incrustations the flax and hemp refuses are boiled with alkalis or earth alkalis, then washed and ground. As the linen and hemp fibres are attacked by the alkaline boiling process, the conditions of this process must be very carefully selected. On the other hand this careful treatment involves that at least one part of the incrustations will remain unchanged. The further removal of the incrustations which are yet present after the alkaline boiling has proved to be very difficult. Numerous experiments were carried out in order to remove these incrustations by multiple chlorination and alkalisation steps.

It was even possible to succeed with this procedure; the last residues, however, could thereby not be removed. These residues remain always as brown lignified particles in the pure white fibre materials, even after repeated strong and extensive hypochlorite bleaching treatments. As already mentioned above these lignified parts are very undesirable in the manufacture of cigarette papers as they tend to give brown spots in the final paper.

Now I have found that if the fibrous material is treated with oxygen evolving substances such as, for instance, hydrogen peroxide, sodium peroxide, sodium perborate, perpyrophosphate or the like the incrustations may easily be removed without causing any damage with respect to the solidity of the material.

In carrying out my invention the flax and hemp refuses are boiled as usual with alkalis and then subjected to rinsing and grinding. After the chlorination process the treatment with oxygen is carried out either during the alkalisation or thereafter. Should the material possess considerable amounts of incrustations a second chlorination and alkalisation may be inserted just before the treatment with oxygen. This is not necessary if the impurities of the fibrous material are only insignificant. In the latter case the treatment with oxygen is inserted before or during the bleaching process. The temperature is expediently maintained at 30 to 50°C during the treatment with oxygen evolving substances. Small quantities of peroxygen compounds, such as for instance, 0.5 to 1.5% are sufficient to obtain a perfect removal of the incrustations after a time of about 2 to 4 hours.

The working up of the material is carried out in a known way, first bleaching with hypochlorite. Thereby I have made the surprising observation that owing to the preliminary treatment of the linen and hemp refuses with oxygen evolving substances only one third of the otherwise used quantity of chlorine is sufficient to obtain an excellent grade of whiteness. After the subsequent washing the good is ground in special devices and brought to the required fineness. Afterwards the necessary filling materials are added and the fibrous pulp carried into the paper mill for the manufacture of cigarette paper. The cigarette papers, manufactured according to my invention are uniformly white without any brown spots. Furthermore, my invention has the advantage to preserve the linen and hemp fibres whereby undesired losses of strength in the final process are avoided, a fact which is very important for the thin consistence of the cigarette papers. That chlorine is also saved may only be just mentioned.

WILHELM GÄRTNER.

MEMORANDUM FOR THE RECORD

Subject: [Illegible]
Date: [Illegible]
To: [Illegible]
From: [Illegible]

[The following text is extremely faint and illegible due to the quality of the scan. It appears to be a multi-paragraph memorandum detailing various administrative or operational matters.]

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ALIEN PROPERTY CUSTODIAN

METHOD FOR THE PREPARATION OF
SUPERIOR CELLULOSE

Wilhelm Gärtner, Darmstadt, Germany; vested
in the Alien Property Custodian

No Drawing. Application filed September 9, 1940

This invention relates to a method for prepar-
ing cellulose products of superior quality which
may be used for the manufacture of paper and
artificial silk products. More particularly, it re-
lates to a process for bleaching cellulose in its
natural state.

Instead of cotton linters and all sorts of rags
cellulosic material of various origin may be used
for the manufacture of qualified, even highly
qualified papers as well as for the manufacture of
special artificial silk products. It is necessary
that these celluloses are of a superior whiteness
and have no tendency to darken subsequently;
moreover, the cellulosic material must have a
high fibre solidity. In the production of artificial
silk the cellulosic material should consist of al-
most pure alpha cellulose and should be able to
give solutions of high viscosity. In the manu-
facture of qualified papers as well as of special
artificial silk products it is therefore important
to use celluloses with a superior grade of purity,
i. e. with a very low degree of incrustating at-
tendant substances.

The various commercial celluloses are far from
being suitable for the above mentioned purposes.
By prolonged improvements it was, however, ap-
proximately possible to adapt their qualities to
the requirements of the special purposes. Thus,
for instance, the cellulose will be improved by a
hot or cold treatment with alkaline solutions, i. e.
the grade of purity will be increased, and above
all the content of alpha cellulose enriched. Chlo-
rination removes the incrustations and the de-
sired grade of whiteness is to some extent ob-
tained after an one stage or multi stage bleach-
ing process.

The progressive improvement of the cellulose
by increased steps of treatment, however, causes
the disadvantage of a greater loss of fibres as well
as of a considerable raising of the expenses. More-
over, the solidity of the fibres will be weak-
ened to a certain extent during the long working
process whereby especially the bleaching treat-
ment with active chlorine exerts a harmful
influence on the purified fibre. The at-
tempt was therefore made to substitute the chlo-
rine for oxygen evolving means, that is peroxygen
compounds, for instance, hydrogen peroxide, so-
dium peroxide, sodium perborate or the like. The
improvement which could be obtained by a
bleaching process with oxygen was surprising:
the fibre was not attacked and had a high grade
of whiteness whilst the tendency to a subsequent
darkening was not observed.

The treatment with oxygen evolving chemicals
was hitherto carried out with a material of a
definite content of cellulose of 5 to 8 percent per
unit of bath liquid equal to the concentration in

bleaching with active chlorine in a hollander, in
stirring vessels or bleaching hollanders. This
treatment, however, has the disadvantage that
the oxygen absorption takes a very long time and
that in consequence thereof extension of time for
this process is necessary.

Thorough investigations have now shown that
this last fact is due to the extraordinarily low
concentration of the peroxygen compounds. This,
on the other hand, is compulsorily provoked
by the low content of cellulose in the material
which must be used in this method. Now I have
found that the time of reaction may be consider-
ably shortened if the fibrous material subjected
to a treatment with peroxygen compounds has a
higher content of cellulose. It is thereby even
possible to make the process run continuously if
only some precautions are observed. As the
treatment is usually carried out with an alkaline
reaction, the increased concentration at the same
time yields to an increased purification of the cel-
lulose. It is even possible to increase the alkali-
nity to such a degree that an improvement as to
an improvement of the alpha cellulose content is
obtained. It is therefore possible to obtain a
superior as well as a bleached cellulose in one
single operation step.

In carrying out my invention I proceed in such
manner that after chlorination and alkalisation
the cellulose is brought to a cellulose content in
the material of over 10 percent, for instance, by
dehydration with a cellular filter, by centrifuging
or the like. After leaving the dehydration ap-
paratus the material is digested with the neces-
sary chemicals and intimately mixed, if neces-
sary, with the addition of vapor for heating. By
a suitable conveying agent the mass is contin-
uously guided through receptacles such as vats,
boxes or the like. The velocity of the transpor-
tation is expediently adjusted in such manner
that the good passes through the vessel during
a time of one half to two hours in maximo. The
subsequent finishing bleaching treatment is car-
ried out as usual, whereby the amount of hypo-
chlorite necessary for the attainment of a definite
bleaching effect is but considerably decreased. Working
according to my invention has the ad-
vantage that the process for the manufacture of
superior cellulose is remarkably simplified whilst
the characteristic benefits of the oxygen bleach-
ing treatment are distinctly enhanced. Besides a
high grade of whiteness the thus treated fibres
possess figures of viscosity which are 2.5 to 3 times
as high as those of a material treated with chlo-
rine. The process of my invention is easily adapt-
able to celluloses of different origin and to any
kind of boiling treatment.

WILHELM GÄRTNER.

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ALIEN PROPERTY CUSTODIAN

PROCESS OF TREATING FIBROUS MATERIALS AND THE MATERIALS THUS OBTAINED

Hermann Haakh, Bad Soden (Taunus) Germany; vested in the Alien Property Custodian

No Drawing. Application filed September 12, 1940

The present invention relates to a process of treating fibrous materials and to the materials thus obtained. It especially relates to an improvement of the felting properties of materials of animal origin.

It is known that the felting properties of hair of animal origin may be improved by treating it with compounds of polyvalent metals, if desired, with addition of wetting agents. The effect of the said compounds, however, is not satisfactory and cannot be compared with that of mercury salts.

Now, I have found that the felting properties of fibrous materials of animal origin may be greatly improved by treating them with compounds of polyvalent metals and with oxalkylation products of aliphatic hydroxy compounds of high molecular weight or of phenols substituted in the nucleus by hydrocarbon radicals of high molecular weight. The process may be carried out either in one or in two stages, for instance, by first treating the material with the oxalkylation product and then causing the compounds of polyvalent metals to act on the material thus treated. In most cases it is possible to use very dilute solutions; the desired effect is obtained already at ordinary temperature, by heating the action is accelerated. The fibrous material may be subjected to any additional treatment, for instance, to a treatment of further improving the felting properties, to a moth-proofing or bleaching process. An especially good effect is obtained by pre-treating the fibrous material of animal origin in the usual manner with oxidizing agents.

As oxalkylation products there may be named, for instance, reaction products from ethylene oxide and alcohols of high molecular weight such as dodecyl alcohol, cetyl alcohol, octadecyl alcohol, oleyl alcohol and naphthene alcohols; there may also be used industrial alcohol mixtures obtained by reduction of fats, fatty acids or fatty acid mixtures or by other technical processes. Instead of ethylene oxide there may also be applied other α,β -alkylene oxides, for instance, propylene oxide or glycidide. Instead of alcohols of high molecular weight there are also suitable other aliphatic hydroxy compounds, for instance, ethanol amides of aliphatic carboxylic or sulfonic acids of high molecular weight. Phenols substituted in the nucleus by hydrocarbon radicals of high molecular weight whose oxalkylation products obtained by means of α,β -alkylene oxides may be used in the present process are, for instance, butyl phenols, hexyl phenols, octyl

phenols, especially $\alpha,\alpha,\gamma,\gamma$ -tetramethylbutylphenol, dodecylphenol, tetradecylphenols or commercial mixtures of phenols obtained by condensation of phenol or cresol with alcohols, olefines or alkyl halides. For instance, there may be used olefines from cracking gases or the polymerization products thereof or chlorination products of high-molecular aliphatic hydrocarbons. It is also possible to start with high-molecular alcohols obtained as by-products in the methanol synthesis from carbon monoxide, to prepare therefrom olefines by splitting off water and to condense these olefines either directly or after dimerization with phenol or cresol.

As polyvalent metals whose compounds are suitable for the present process there are named, for instance, tin, zirconium, thorium, uranium, thallium, aluminium, zinc, copper, titanium, iron, bismuth, cobalt, cerium, tungsten, molybdenum, manganese, nickel, cadmium. It is suitable to use the water-soluble salts of these metals, for instance, the chlorides, sulfates and nitrates.

The following examples illustrate the invention;

(1) Wool felt is placed for 2 hours at ordinary temperature into a dilute, acidified solution of hydrogen peroxide. The material is then dried at 80° C–100° C and soaked for 2 hours at 50° C–60° C in a solution containing 0.7% of the reaction product of 20–25 mols of ethylene oxide with sperm oil alcohol and 0.5% of tin salt. The material has a higher tendency to felt than unmordanted material.

(2) Loose felt from rabbit hair is handled for 15 minutes at 90° C in a solution containing 0.7% of the reaction product from 6 mols of ethylene oxide and 1 mole of iso-octylphenol and 0.7% of tin salt. The material felts better than a corresponding material from hair mordanted with mercury salts.

(3) Loose coney hair is soaked overnight in a solution containing 1.4% of the reaction product from 20 mols of ethylene oxide and 1 mol of sperm oil alcohol and 2% of pink salt. The material is then dried at 80° C–100° C and felted. The felt shrinks more than a felt from hair mordanted with mercury salt and felted with sulfuric acid of 0.1%. Instead of tin chloride there may also be used 2.75% of thallous sulfate.

(4) Felt from unmordanted rabbit hair is soaked overnight in a solution containing 1.5% of the reaction product from 15 mols of ethylene oxide and 1 mol of the ethanolamide of tallow fatty acids and 0.65% of tin salt. The felt

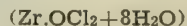
shrinks more than a felt from hair mordanted with mercury salt.

(5) Loose rabbit hair is turned for 15 minutes in a solution of 6% of aluminium chloride and 35% of the reaction product from 25-30 mols of ethylene oxide and oleyl alcohol. The material is then dried at 80° C-100° C and felted. The material has a very good tendency to felt.

(6) Loose hares hair is treated for 45 hours at ordinary temperature with a solution containing 0.35% of the reaction product from 20-25 mols of ethylene oxide and sperm oil alcohol and 4% of nitric acid (specific gravity 1.4). The material is then centrifuged and dried at 80° C. After drying, the hair is handled for 2 hours at 50° C-60° C in a solution containing 0.35% of the reaction product from 25-30 mols of ethylene oxide and oleyl alcohol and 0.6% of tin salt. On felting, the material shrinks much more than a material mordanted with mercury salt.

(7) Coney hair is soaked for 12 hours at room temperature in a solution containing per liter 20 grams of the reaction product from 12' mols of ethylene oxide on 1 mol of dodecylphenol and 20 grams of thallous sulfate. The material is then centrifuged and dried at 80° C. For felting a solution is used which contains per liter 10 grams of the above mentioned phenol derivative and 1 gram of sulfuric acid.

(8) Hares hair is soaked for 15 minutes at 80° C-90° C in a solution containing per liter 10 grams of the reaction product from 25-30 mols of ethylene oxide and 1 mol of oleyl alcohol and 25 grams of zirconium oxychloride



The material is centrifuged and dried at 80° C. By using the mordant solution also on felting the felting process is greatly enhanced.

HERMANN HAAKH.

ALIEN PROPERTY CUSTODIAN

FABRIC-SIMULATING MATERIAL

Lambertus te Strake, Deurne, Netherlands; vested
in the Alien Property Custodian

No Drawing. Application filed September 14, 1940

My invention relates to a material simulating fabric or such like woven textiles, but which material has been manufactured from stockinet or tricot or such like knitted goods or knit-wear in general. My invention relates also to a process of producing such fabric simulating material, and to garments made therefrom.

One object of my invention is to produce a material simulating fabrics or such like woven textiles from tricot or knit-wear, thus obtaining materials which have a certain degree of elasticity and being suitable for being used in the clothing-industry.

The material according to my invention has the appearance of woven textiles, and especially that of cloth, and is easily workable. Garments made from the material according to my invention fit very well and are very comfortable in wearing.

According to my invention tricot or stockinet or such like knitted materials or knit-wear are fulled and then stretched and are further subjected to known treatments. The fulling-operation may be applied to the tricot or knitted material in the well known tubular form after which the material is washed and cut in the length of the tube and afterwards stretched.

I prefer to full in such a way that the length and/or the width is decreased more than 20%, e. g. 40-50%, and thereupon the stretching is carried out.

A further advantage of my invention is that the danger of tearing is much less than with ordinary woven textiles, as the material according to my invention does not possess warp and weft.

In my specification and claims the words "tricot", "stockinet", "materials of the tricot-class", "knitted goods" and "knit-wear" are intended to cover the materials produced by means of circular knitting machines, circular knitting-machines with spring needles, or with beard needles, warp knitting looms, flat knitting machines, the Maratti-machine and such like machines or looms.

In order to elucidate my invention the following example is given, which is not intended to limit the scope of protection.

Tricot or such like knitted material in tubular shape is fulled in a fulling-trough or fulling-machine, e. g. by means of a solution of Marseilles-

soap, at 25° C during 1 or 2 hours. The duration and the other conditions of the fuller-reaction are controlled in connection with the degree of fullness required. The addition of the soap solution is carried out preferably during the material is running in the machine.

The rims of the piece are stitched together as usual and the piece is applied onto the reel. As soon as the piece is moist throughout it is allowed to run in the machine for another period of about 1 to 2 hours. The length of the piece has now been diminished by 40 till 50% and the width by 25% or more. Thereupon the piece is washed with lukewarm water (25-30° C.) till the soap solution has been removed well. Finally the material is centrifuged till air-dry, laid down flat or rolled up and cut lengthwise.

The material treated as described is tightened and dried. After being stretched to the desired degree, the material is sheared once or several times till it is sufficiently smooth. Thereupon it is decatized, e. g. with steam. The temperature is regulated in accordance with the desired properties of the material. The material can be made free of shrinkage and pressed. If desired the material is subjected to roughening in order to obtain a so-called "loden" appearance.

By applying the process according to my invention to tricot obtained by means of the Maratti-machine, i. e. to tricot in a tubular shape with a circumference of e. g. 176 cm the shrinkage is carried out till about 125-130 cm. Stretching is carried out in such a way that the final circumference is about 135-140 cm.

It is possible to stretch further dependent on the degree of fulling. Strong stretching, however, will diminish the "fabric-effect" and also the thickness of the final product.

I prefer to dry the material when in a stretched condition, which is the best technical method. However, this is not necessary and very sensible materials should be stretched first, then dried in a loose condition, after which it is stretched again, e. g. on rollers.

The material obtained according to my invention is very suitable for making garments for gentlemen, ladies and children, these garments combining the favourable properties of tricot with the appearance of woven textiles.

LAMBERTUS TE STRAKE.

1870-1871

The following table shows the results of the election for the year 1870-1871. The table is divided into two columns, one for the number of votes and one for the names of the candidates. The names of the candidates are listed in the first column, and the number of votes they received is listed in the second column. The names of the candidates are listed in alphabetical order, and the number of votes is listed in descending order.

| Name | Votes |
|------------------|-------|
| John A. Smith | 120 |
| James B. Jones | 110 |
| William C. Brown | 100 |
| Robert D. White | 90 |
| Thomas E. Green | 80 |
| Charles F. Black | 70 |
| Henry G. Grey | 60 |
| John H. White | 50 |
| James I. Black | 40 |
| William J. Grey | 30 |
| Robert K. White | 20 |
| Thomas L. Black | 10 |

ALIEN PROPERTY CUSTODIAN

SHOE-TIP TACKING MACHINE WITH PUNCHING DEVICE

Walter Gleissner, Weissenfels-Saale, Germany;
vested in the Alien Property Custodian

Application filed September 23, 1940

Machines are known for making shoes, particularly tacking machines. With these known machines the shoe is guided so that the working part moves continuously from the one side of the shoe round the tip to the other side of the shoe. This manner of guiding the shoe is not applicable in the case of tacking machines with a punching device.

The invention relates to a shoe-tip tacking machine with a shoe support moved by the machine drive. The invention consists therein that the machine is provided with a punching device and that the shoe support is controlled by an auxiliary shaft rotated alternately to the right and to the left so that the tacking and punching, commencing at the shoe-tip, is first effected towards the one side of the shoe, whereupon the tools are stopped and the drive of the auxiliary shaft is disengaged, the shoe support returning to the initial position, and when the machine is started again, the auxiliary shaft is driven in opposite direction and the other side of the shoe is worked. The machine makes it possible to tack the front of the shoe, commencing at the tip, in one single automatically effected operation with simultaneous punching, avoiding damaged goods usually occurring in manual guiding, relieving the operator, and ensuring that, apart from proper stretching of the leather, the punching is effected at equal distances from the edge of the shoe, the distances between the punched holes are approximately equal, and that the working of the leather on to the edge of the last, the punching, and the shifting are effected in a perfect manner.

Another feature of the invention is that the auxiliary shaft, after each complete revolution, controls an automatically disconnected coupling, whose driven part upon each revolution causes a partial rotation of the steering shaft, controlling the shoe transport and the engagement of the tacking and punching device, corresponding to one of the several, for example four, partial motions of the shoe support. Thus it is attained that all operations of the machine are positively performed in correct succession, without requiring special manipulations. Therefore, the machine, when started, moves the shoe support in such a manner that the shoe, from its position of rest, first performs a movement to the left, then returning, moving to the right and returning again.

The switching shaft is connected with the driven coupling part by a pair of toothed wheels, the toothed wheel on the switching shaft hav-

ing a diameter four times as large as the counter-wheel arranged at the driven half of the coupling. Each complete revolution of the driven half of the coupling, therefore, corresponds to a quarter of a revolution of the switching shaft. The throwing-in of the coupling for performing the four successive partial revolutions of the switching shaft may, for example, be effected by means of a controller wheel driven from the auxiliary shaft and acting via stops upon the control rods of the coupling. For controlling the transport and for engaging the drive of the shaft of the tool head, a cam is arranged on the switching shaft. This cam is provided at the bottom with two equal curves displaced by 180 degrees with respect to each other, their optional use making it possible to commence the transport of the shoe either to the left or to the right. For producing the forward feed, it is advantageous to use a link drive, which is moved from the shaft of the tool head and thereby drives the auxiliary shaft with the shoe support intermittently at regular intervals. By reversing the link, the forward feed is changed from left hand to right hand motion. The coupling rods, which are controlled from the machine for engaging the drive of the shaft of the tool head, are provided with a lever operated by the hand or the foot, whereby optional stopping of the machine drive is made possible, in order to be able to thus interrupt the tacking work at any time.

A constructional form of the subject of the invention is illustrated by way of example in the accompanying drawing in which:

Fig. 1 is a total view of the gear,

Figs. 2 and 2a are a side view and a diagram of the transporting device,

Fig. 3 is a side view of the changing-over and coupling device,

Figs. 4 to 6 show the transport guiding and the transport pulley driven thereby,

Figs. 7 to 8 show a blocking device for the transport pulley, and

Figs. 9a to 9c are partial views of the shoe.

The V-belt pulley 40, which is rigidly connected with the driven pulley 39, runs loosely on the shaft 33 of the tool head and drives the coupling pulley 41 which is mounted on the bolt 42. The pulleys 39, 40, 41 are, therefore, in continuous rotation, even when the machine itself is not engaged for operation. The toothed wheel 45, which is rigidly connected with the coupling part 44, engages the toothed wheel 46 attached to the shaft 47, the diameter of the toothed wheel 46 being four times as large as

that of the toothed wheel 45. The cam 46 is also rigidly mounted on the shaft 47, whereas the cams 49 and 50 may be shifted on the shaft 47 in its longitudinal direction by the hand lever 51, in order to bring the rolls 52 or 53 of a control lever 54 optionally into engagement with the gear groove 41' of the cam 49 or 50' of the cam 50.

The arm 34a of the lever 54 causes via the rod 55 (Fig. 2) the reversal of a transporting and blocking device for the motion of the shoe, which will be described hereinafter, to left hand or right hand rotation. The double arm 54b of the control lever 54 serves to control a coupling provided between the shaft 33 of the tool head and the continuously rotating pulley 39. For this purpose, it carries two links 57 and 58 (Fig. 2), whose slots surround the bolt 59 of a releasing lever 60. This releasing lever is connected by a bolt 61 with a steering rod 62, linked to the frame 13 by the bolt 63 and drawn towards the frame by the spring 64. Also linked to the bolt 61 is the rod 65, which is connected to a pedal 66. The releasing lever 60 is controlled by a control lever 54 via one of the links 57 or 58 in order to press the releasing rod 68 via the arm 60a and the catch 67 in upward direction. Thereby the coupling (not illustrated) connecting the shaft 33 of the tool head with the continuously rotating driving pulley 39 is thrown in. The shaft 33 carries, besides the usual cams for the tacking tools and the punching device, a further cam 69, moving the reversible shoe transport mentioned above by the arm 54a via the angle lever 70 and the rod 71, with the aid of the transport pulley 72 rigidly mounted on the shaft 21.

Fixed to the shaft 21 is the toothed wheel 105 engaging a controller wheel 106 fixed to the shaft 107 and provided with a fixed stop 116 and two adjustable stops 114 and 115. The spring boxes 108 of the shaft 107 with the bolts 109 receive pre-tensioned torsional springs 110 and 111. In the position of rest, i.e. in the initial position of the shafts 107 and 21 and at the same time of the shoe support 3 both spring legs 110a and 111a lie on the stationary supporting bolt 113. If the shaft 107 is moved, for example, in anti-clockwise direction, which amounts to a steering to the left of the shoe support 3, the tension of the spring 111 is increased, whereas the spring leg 110a of the spring 110 moves away from the supporting bolt 113, so that this spring becomes ineffective. If, on the other hand, the shaft 107 is moved in clockwise direction, the shoe support being steered to the right, the spring 110 is further tensioned and the spring 111 becomes ineffective. The spring 110 or 111, whichever is tensioned, serves to retain the shoe support 3, as well as the switching and reversing elements connected therewith, in the initial position or to return them into the position of rest.

The automatic throwing in of the coupling between the pulleys 41 and 44, shifted after each revolution of the pulley 41, is effected from the controller wheel 106. The star lever 118 mounted on the bolt 117 (Fig. 3) co-operates with the stops 114, 115, and 116 of the controller wheel 106, the switching lever 119 being linked as a fork to the star lever 118 transverse to the longitudinal axis of the bolt 117. The spring 120 (Fig. 1) keeps the switching lever 119 out of the path of the stop 116 and in contact with a plate-shaped widening of the angle lever 121, which is connected by the rod 122 with the lever 123 (Fig. 3) oscillating about a stationary bolt. This lever 123

is controlled by the bolt 124 of the toothed wheel 46. The star lever 118 lies with its one arm 118a in the path of the stops 114 and 115 of the controller wheel 106 and carries links 125 and 126 linked to its two other arms. The links enclose with their slots the bolt 127 of the interrupter 128 controlling the coupling lever 132 and therewith the coupling bolt 43 of the pulleys 41 and 44 via the interrupting latch 129 of the lever 130 and the rod 131.

The parts described so far operate as follows:—

After the shoe 1 has been placed on the shoe support in its central position shown in Fig. 9a, the coupling pulley 44 is connected by the bolt 43 with the coupling pulley 41 with the aid of the pedal 128a (Fig. 3) via the levers 123, 130, 132, whereby the toothed wheel is caused to make one revolution. Consequently, the shaft 47 performs a quarter of a revolution by 90 degrees, i.e. its first partial revolution. In the illustrated position of the lever 51, the lever 54 is thereby oscillated by the curved groove 49' of the cam 49 into the position I (Fig. 2), whereby its arm 54a also brings the transport guide 85 into the position I. At the same time, the link 58 lifts the releasing rod 68 via the lever 60, so that the shaft 33 of the tool head is coupled with the continuously rotating pulley 39 and is caused to move. By means of the curved groove 69' of the cam 69, the shoe support is turned via the transporting and feeding device, which will be described hereinafter, and the other cams mounted on the shaft 33 control the tacking and punching tools for tacking the shoe from the centre of the tip towards the left side. During this time, the toothed wheel 105 of the shaft 21 turns the shaft 107 (Fig. 3) with the controller wheel 106 in anti-clockwise direction until the stop 114 comes into contact with the switching arm 118a of the star lever 118 and oscillates the latter about the bolt 117, whereby the link 125 moves the lever 128 so that the coupling 41 to 44 is thrown in again.

In the now effected second partial revolution of the control shaft 47, the lever 123 is pressed down by the bolt 124 and brings the switching lever 119 via the pressing rod 122 and the lever 121 (Figs. 1 and 3) into the range of action of the stop bolt 116 of the control wheel 106. At the same time, the lever 54 (Fig. 2) is guided by the curved groove 49' back into its central position M. Therefore, the double arm 54b releases the lever 60, so that the releasing rod 68 falls off and the coupling between the pulley 39 and the shaft 33 of the tool head is disconnected. When the shaft 33 comes to rest, the tacking and punching tools and the transporting device are stopped. Upon bringing the transport guide 86 into its central position again by the arm 54a, the blocking 89 to 96 (Fig. 7) which will be described later on, is released. After the blocking has been removed, the shaft 107 and, therefore, the shoe support 3 return, owing to the action of the tensioned spring 111, into the central (initial) position. At the end of the return motion, the stop bolt 116 knocks against the switching arm 119 of the star lever 118 and reconnects the coupling 41 to 44 via the link 126 and the arms 128, 130, 132, so that the control shaft 47 performs its third partial revolution.

In the third partial revolution of the shaft 47, the bolt 124 of the toothed wheel 46 releases the arm 123, so that the spring 120 can again move the switching arm 119 out of the path of the bolt 116. Now, the curved groove 49 oscillates the lever 54 into the position II, whereby the arm 54a

also moves the transport guide 86 into the position II. At the same time, the shaft 33 is again coupled with the pulley 39 by the link 57 of the double arm 54b via the lever 60 and the rod 68. Now, the shaft 33 steers, from the curved groove 69' of the cam 69 via the reversed transport guide 86, the drive of the shoe support towards the other side and at the same time operates via its other cams the tacking and punching tools so as to effect the tacking of the second half of the tip. As the shaft 107 now turns in clockwise direction, the switching bolt 115 steers, at the end of the third partial revolution, the coupling 41 to 44 by acting upon the arm 118a of the star lever 118 via the link 126. Then, the control shaft 47 performs its fourth and last partial revolution, by which the lever 54 is returned into its central position and thus, on the one hand, moves the link 86 via the arm 54a back into its central position and, on the other hand, releases with the link 57 the lever 60 for disconnecting the coupling of the shaft 33. Therefore, the shoe transport and the tool drive come to rest and the blocking of the shoe transport is removed. The return of the shaft 107 and, therefore, of the shoe support 3 into the central position is effected by the spring 110, which is tensioned during the third partial revolution. The machine now comes to rest, as the switching lever 119 is now outside the path of the stop 116, so that an automatic throwing-in of the coupling 41 to 44 cannot be effected.

The two cams 49 and 50, which can be shifted from the hand lever 51 on the shaft 47, carry similar curves displaced by 180 degrees with respect to each other, as indicated in Fig. 2. By optionally connecting one of these curves with the corresponding rolls 52 or 53 of the lever 54, the transporting motion of the shoe support may either be commenced by the left-hand or by the right-hand action.

As already mentioned, the revolution of the shaft 21 to the left and to the right, steering the shoe support 3, is effected via the levers 70 and 71 and the transport pulley 72 by the curved groove 69' of the cam 69. The transport lever 73 (Figs. 4 to 6), with its double clamping lever 75 oscillating about the bolt 74, is rotatably mounted on the hub of the transport pulley 72. Two switch levers 79 surrounding an axle box 78 fixed to the machine frame, are drawn with their legs in the position of rest by a spring 80 towards a stationary stop 77 and thereby retain the double clamping lever 75 by means of its resting bolt 76 in its ineffective position (Fig. 5). The transport lever 73 is joined by the bolt 82 to a rod 83, which is connected with the rod 71, steered from the curved groove 69', by a link bolt 84 carrying the slide block 85. This slide block 85 engages the transport guide 86, which is oscillatable about the stationary bolt 87 and is brought, as already mentioned, by the arm 54a of the lever 54, according to the position of the curved groove 49' or 50', from the central position M into the position I or II (Fig. 2). When the transport guide 86 is in the position I, the left clamping jaw of the double clamping lever 75, in the downward movement of the slide block 85 caused by the curved groove 69' via the levers 70 and 71, engages under the action of the spring 80 the transport pulley 72 and thereby causes a partial revolution of this pulley and, therefore, of the shaft 21 and of the shoe support 3. The return movement of the shaft 21, which would be caused, when the slide block 85 moves upwards, by the spring 110 or 111 via the shaft 107 and the toothed

wheels 106 and 105, is prevented by the blocking indicated in Figs. 7, 7a, and 8.

According to these illustrations, the transport pulley 72 co-operates with a blocking wheel 90, which is joined by the bolt 90', the rod 89, and the bolt 88 to the transport guide 86. The segment discs 95, mounted in the blocking wheel 90 and subjected to spring action, press the freely movable clamping rolls 92 and 93 against a stationary stop 94, so that, in the central position of the transport guide 86 and, consequently, with the blocking wheel 90, the pulley 72 is able to freely turn with the shaft 21 in both directions. But, if the guide 86, as indicated in Fig. 8, is in the position I according to Fig. 2, the clamping roll 93 will act with the co-ordinated wedge surface of the blocking wheel 90 in such a way that the pulley 72 is turned with the aid of the left clamping jaw of the lever 73 in clockwise direction and is blocked in opposite direction. On the other hand, in the position II of the guide 86, the pulley 72 is turned in anti-clockwise direction by the right clamping jaw of the lever 73, the clamping roll 92 with the co-ordinated wedge surface of the blocking wheel 90 preventing the backward rotation. Therefore, with each revolution of the cam 69 of the shaft 33, a short partial revolution of the shaft 21 is effected, so that the shoe support is turned with interruptions at regular intervals, as long as the shaft 33 revolves.

In the central position M of the transport guide 86, the blocking device is ineffective, so that the shaft 21 with the shoe support 3 is turned back by the spring 110 or 111, whichever is tensioned. In this position of the guide 86, any further moving of the slide block 85 would be practically without influence upon the shoe transport. The steering of the tensioning device by means of the rod 39 could, of course, also be effected by a special cam on the shaft 47.

By shifting the working point 97 of the lever 56 at the transport guide 86, the size of the oscillating angle α of the transport guide 86 may be varied. This also alters the deflection of the lever 73 and the amount of the partial revolutions of the shaft 21, which is equivalent to a decrease or increase of the spacing of the tacks (Figs. 9a and 9b). The shifting of the point 97 may be effected by a lever 100 via the rod 98 linked at 99 in such a way that the spacing of the individual tacks is altered, for example increasing the spacing of the tacks from the tip towards the side (Fig. 9c). If, in this case, the lever 100 oscillating about a bolt 101 is steered by a cam 102 driven by the machine, as indicated in Fig. 2, the spacing of the tacks is altered completely automatically.

The cam 48 fixed to the shaft 47 serves to keep the shoe, while being worked, constantly in contact with the stop 37. The curve roll of the pulling lever 134 oscillating about the bolt 133 engages the cam 48. At the lever 134, the slide rod 138 is guided by the blocking rolls 137, the piston 139 of the tension spring 140 being joined to the slide rod 138, the sleeve 141 of the spring 140 being connected to the oscillating support 11 of the shoe support 3. In the position according to Fig. 1, the blocking rolls 137, which are pressed against each other by springs, rest on inclined surfaces of the lever 134 and thus block the rod 138. However, when the machine does not move, a blocking lever 135 oscillatably mounted at the pulling lever 134 leans against a stationary stop 136. Thereby, the rolls 137 are

separated, so that the rod 138 and, thereby, the oscillating support 11, is released.

The shoe support 3, 11, after the shoe 1 has been placed thereon, is moved by hand towards the stop 37 and is first held. When starting the machine, the pulling lever 134 is moved already at the commencement of the first partial revolution of the control shaft 47 by the curved groove 48' of the cam 48 in such a way that first the blocking lever 135 is released and, therefore, the blocking of the slide rod 138 at the lever 134 is effected, which in the further revolution of the cam 48 tensions the spring 140. The shoe is thereby held powerfully against the shoe stop 37. At the end of the fourth partial revolution of the shaft 47, the tension of the spring 140 and

the blocking of the slide rod 138 at the pulling lever 134 are released, and the shoe support can move back.

By moving the lever 62 (Fig. 2), for example by means of a pedal 66a, it is possible at any time to interrupt the tacking operation. When lifting the lever 62, the bolt 61, hitherto serving as pivot for the lever 60, is shifted upwards. The lever 60 occupies the position indicated by dotted lines in Fig. 2, the bolt 59 serving as fixed pivot, and the end 60a of the lever releasing the releasing rod 68. In this way, the shoe can be tacked by steps or even be moved back into its central position without being worked.

WALTER GLEISSNER.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

W. GLEISSNER
SHOE-TIP TACKING MACHINE
WITH PUNCHING DEVICE
Filed Sept. 23, 1940

Serial No.
357,954

5 Sheets-Sheet 1

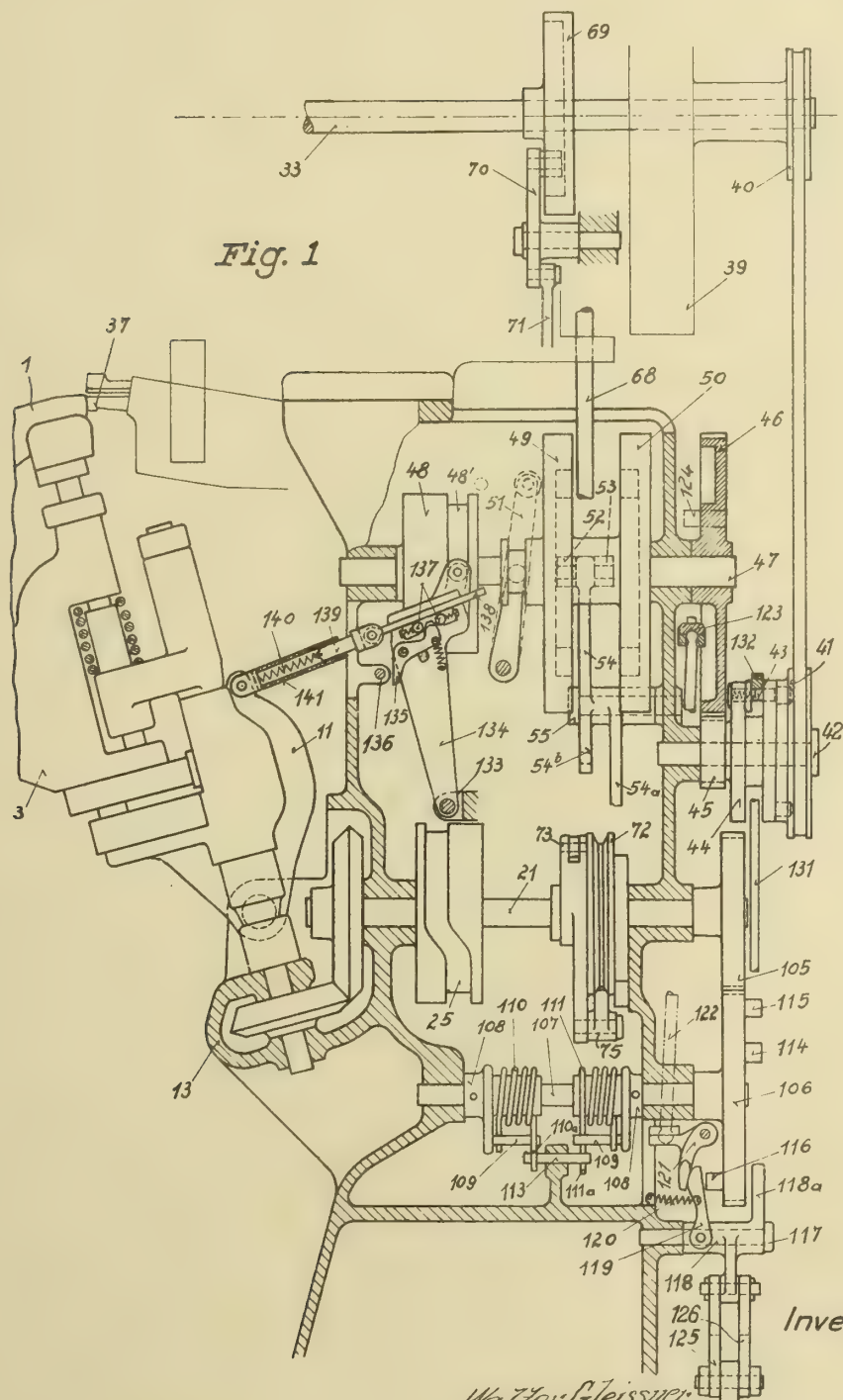
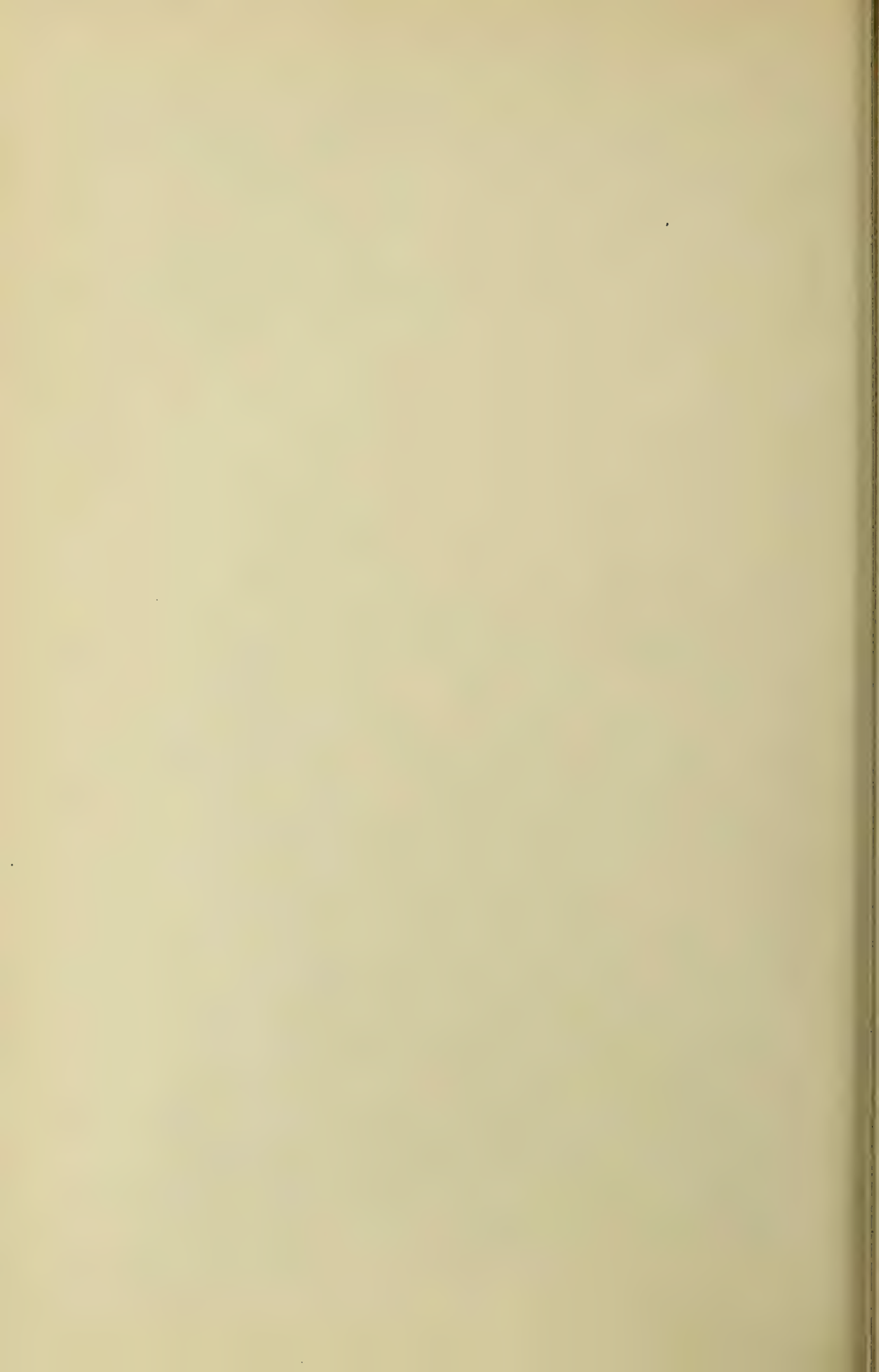


Fig. 1

Inventor:

Walter Gleissner
By J. J. Swire Atty.

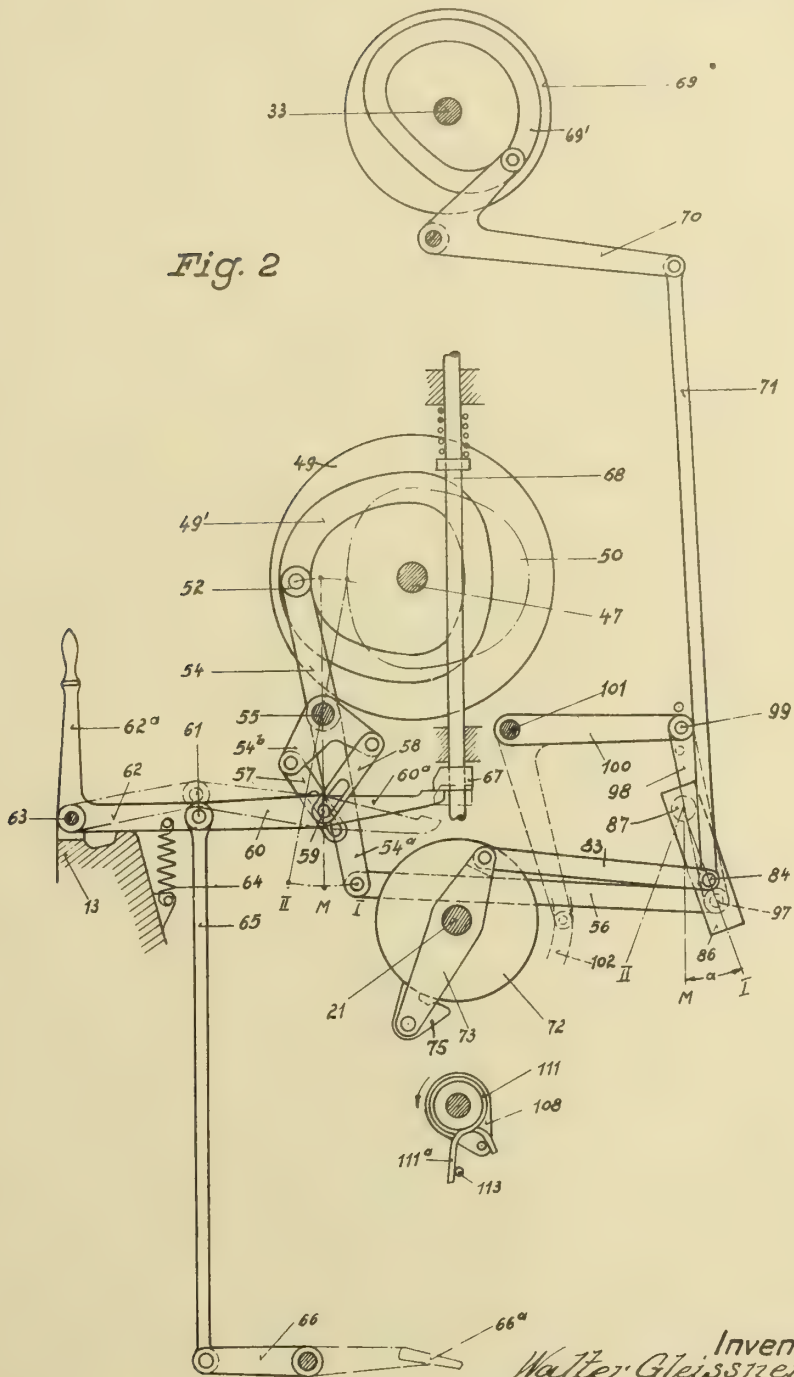


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5 Sheets-Sheet 2



Inventor:
Walter Gleissner
by J. L. Swine
Atty

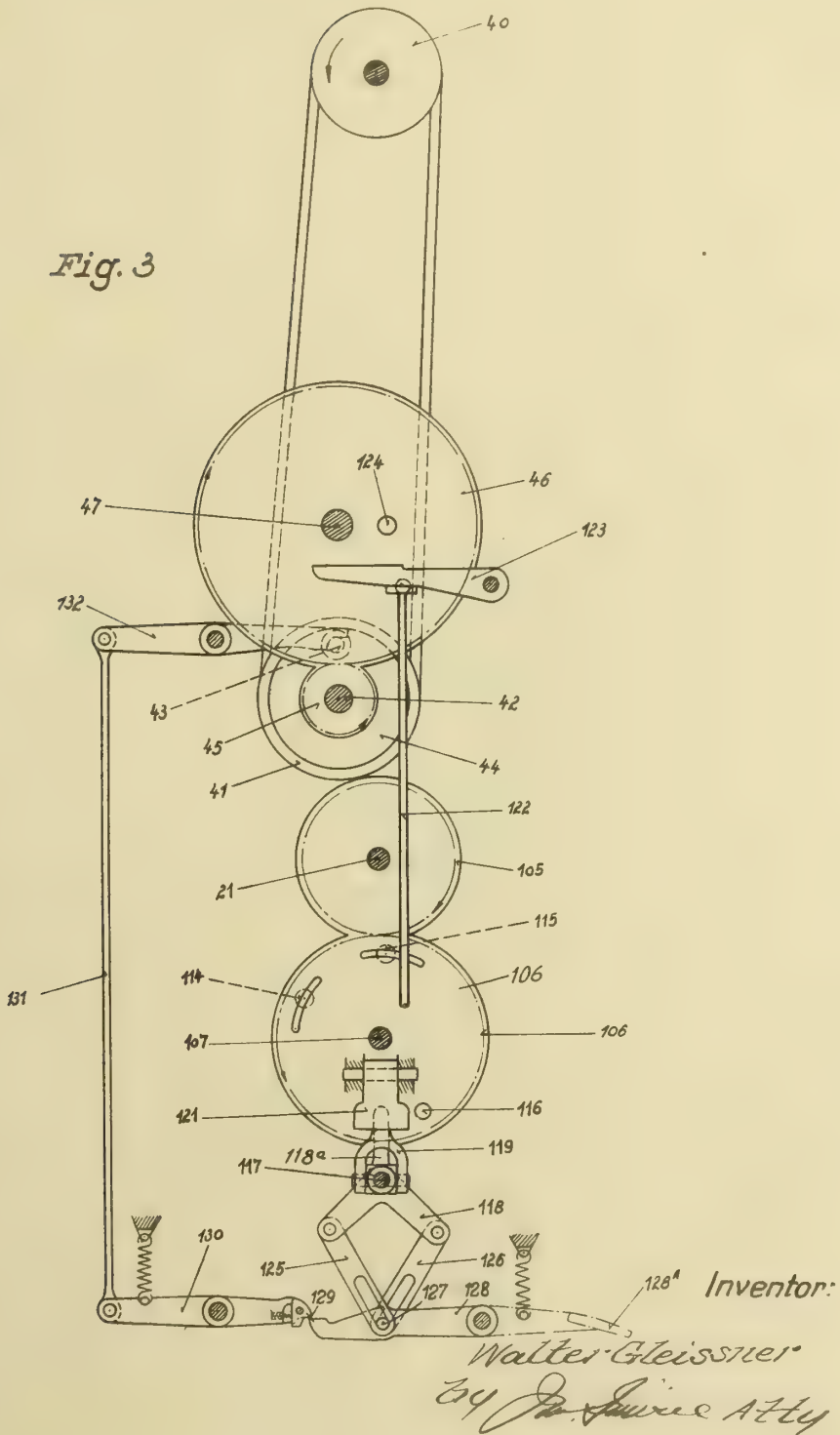


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5 Sheets-Sheet 3

Fig. 3





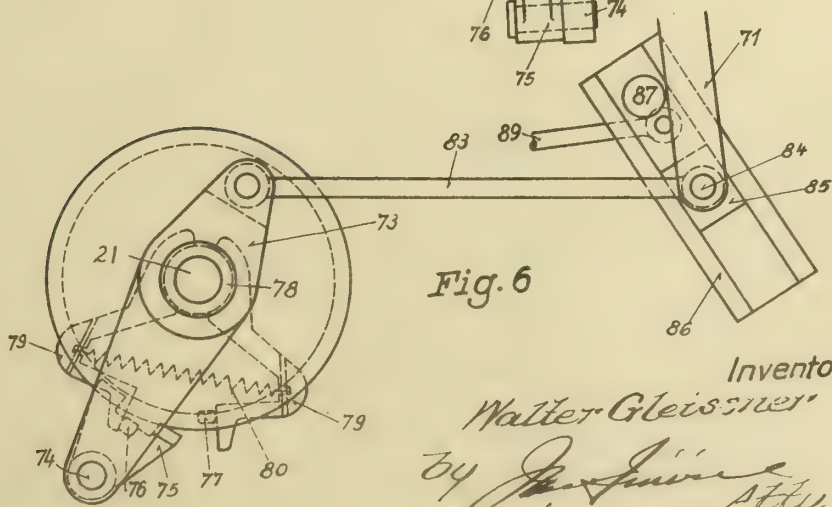
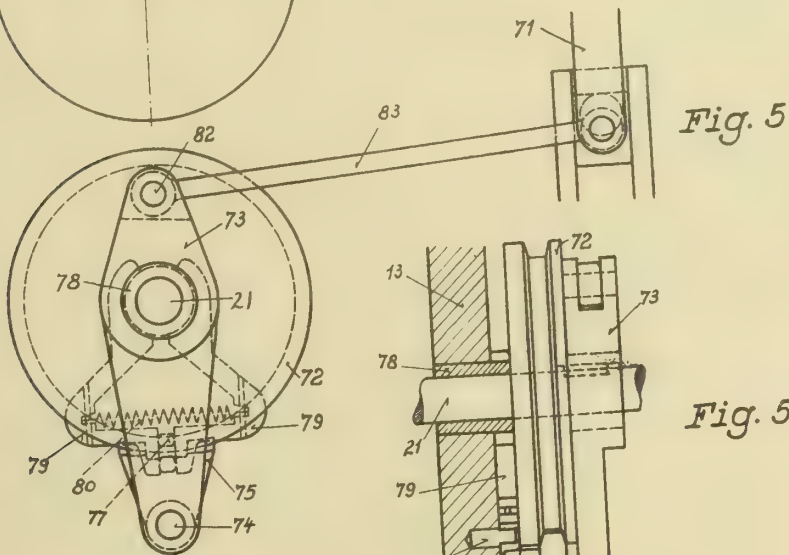
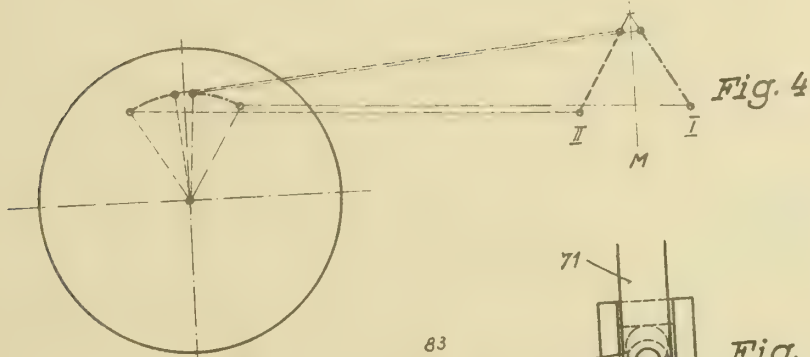
APRIL 27, 1943.

BY A. P. C.

W. GLEISSNER
SHOE-TIP TACKING MACHINE
WITH PUNCHING DEVICE
Filed Sept. 23, 1940

Serial No.
357,954

5 Sheets-Sheet 4



Inventor:

Walter Gleissner

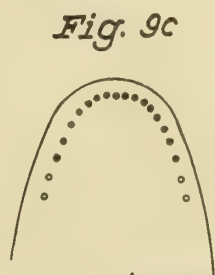
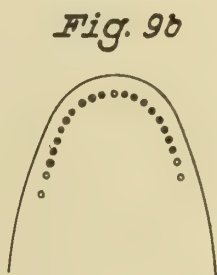
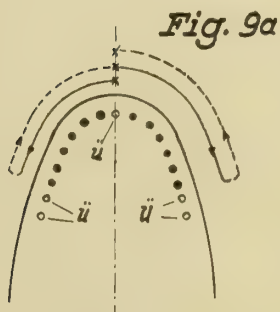
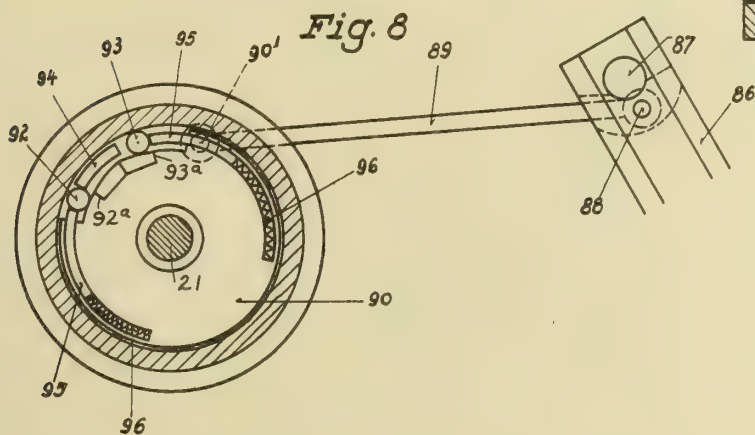
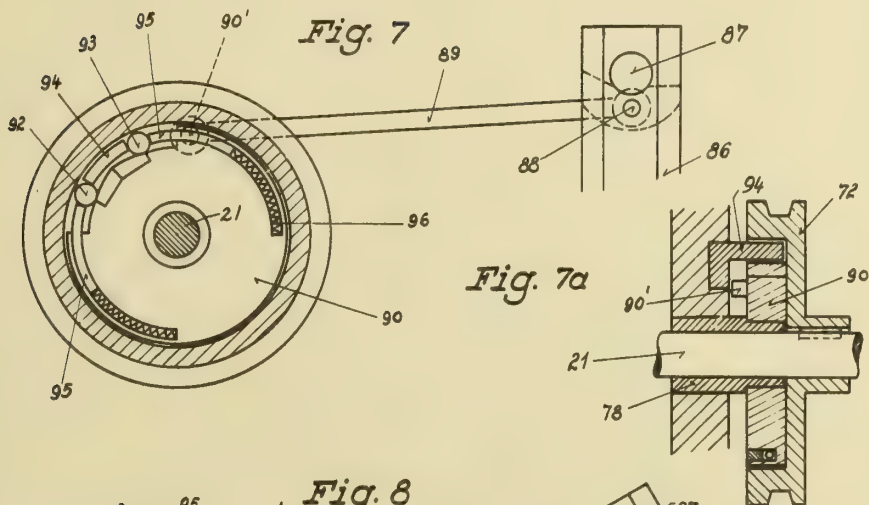
34 *James F. Smith* *Atty.*



PUBLISHED
APRIL 27, 1943.
BY A. P. O.

W. GLEISSNER
SHOE-TIP TACKING MACHINE
WITH PUNCHING DEVICE
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Serial No.
357,954
5 Sheets-Sheet 5



Inventor:
Walter Gleissner
by *J. J. J. J. J.* Atty.



ALIEN PROPERTY CUSTODIAN

REGULATING DEVICE FOR PILE-DRIVER MONKEYS

Paul Pfeiffer, Hamburg-Altona, Germany;
vested in the Alien Property Custodian

Application filed September 23, 1940

Regulating devices for pile-driver monkeys, in which there is a regulating piston inside the working piston, are already known. Various forms have been suggested here, but owing to their complicated construction and the difficulties arising in their actual use, they have hitherto been practically unable to meet with any recognition. It has been suggested, for instance, to fit a three-part regulating piston inside the working piston, whereby very many channels would have to be bored within the latter, besides which the regulating piston must be correspondingly developed as a three-part piston and all other channels adapted to that figure. That is extremely awkward for the manufacture and for the operation, and no satisfactory practical solution has been found.

Here the present invention comes in, which, quite apart from being easier to produce, is also simpler in its operation.

In this invention a regulating device for steam monkeys is provided, in which, within the hollow piston rod of the working piston, there is a regulating piston, with a larger piston above to move the regulating piston and a smaller adjusting piston below to regulate the inlet and outlet steam for the working piston. The regulating piston regulates the driving medium for the working piston and the latter regulates the driving medium for the regulating piston, so that the monkey can strike automatically. In order to attain this end the upper regulating piston and the working piston are connected by channels.

On the crosshead of the piston rod there is a steam distributor with which single strokes and also strokes with a smaller drop can be given. This arrangement is necessary when ramming into soft soil and at the beginning of each ramming process, so that the pile does not sink away too quickly, as otherwise the monkey can be damaged. The monkey is hand-regulated with the steam distributor by pulling a rope. A spring brings the distributor back to its starting point.

In the tests at the manufactory, in order to protect the pile and to avoid jarring, the monkey must not strike, but must be caught up by premature reversal of the driving medium. This is effected by the steam distributor and by using a weight Fig. 5.

In one construction given as an example the invention is shown in the annexed drawing:

Fig. 1 shows the monkey with the striker in its lowest position, where it stands on the pile.

Fig. 2 shows the monkey at the commencement of reversing from lifting to dropping.

Fig. 3 shows the monkey in its highest position shortly before reversing for the drop. The monkey reaches this position by expansion of the steam and by inertia.

Fig. 4 shows a partial section, in order to indicate the situation of the steam distributor 9 towards the left.

Fig. 5 shows a partial section to indicate the weighting of the steam distributor 9 over the cranked lever 18 with the weight 17.

Fig. 6 shows an enlarged representation of the steam distributor 9 in section in its details in one special construction.

The steam passes through the steam inlet connection 5 into the hollow piston rod 12 and fills the space between the upper and lower regulating piston 2. From there, as shown in Fig. 1, the steam can pass through the channel 6 in the piston rod 12 into the channel 7 in the wall of the cylinder 1 and from there through suitable annular depressions in the cylinder 1 into the channel 8 and 28 and through the D of the slide valve 9 into the cylinder space 10 over the upper regulating piston. The regulating piston 2 is thus moved from its upper position shown in Fig. 2 into the position indicated in Fig. 1; thereby the lower regulating piston passes beyond the slot 11, so that the steam can now pass from the ring space of the piston rod 12 through the slot 11 into the cylinder space 1 and lift the monkey 13.

When the monkey has reached the position shown in Fig. 2 the steam leaves the space 10 over the regulating piston through the channel 3 and through the opening 14 into the open air. The regulating piston 2, the upper piston of which is larger than the lower one, is thereby brought by steam pressure into the position as shown in Fig. 2. The steam can now pass out from the cylinder space 1 through the slot 11 into the cylinder space 2 and from there through the exhaust opening 4 into the open air. The monkey 13 rises to the position of Fig. 3 and then drops down on the head of the pile. (Position Fig. 1.) Through the channel 7 and 8 the steam can now again pass from the ring space over the lower regulating piston 2 into the space 10 over the upper regulating piston and press down the latter, whereupon the monkey again begins to rise. At the commencement of the ramming work it is necessary to give short strokes, as the pile still draws strongly. That is the purpose of the steam distributor 9. When the monkey is rising the steam distributor can be moved to the left by a downward pull of the rope 15 (cf. Fig. 4). This causes the steam from

space 10 over the regulating piston 2 to pass through the inlet channel 23 and the exhaust channel 16 into the open air. The regulating piston 2 rises, reverses, and the monkey falls. If the rope 15, after having been pulled downward, is held firmly, the monkey cannot rise, because the steam entering through channel 7 can pass out into the open air again through the channels 23 and 16. It is therefore possible also to give single strokes of any desired drop.

For trying out new monkeys at the works it is necessary, for the purpose of running in the piston and the regulating piston, to let the monkey dance, i. e., the monkey is not allowed to drop right to the bottom, but reversed sooner, so that steam enters the cylinder space 1 and catches up the falling monkey, because otherwise any stop would soon be smashed by the heavy monkey. This running in is done at the works and is also necessary in many cases of repair. For that purpose the regulating piston 9 (Fig. 5) is weighted at its cranked lever 18 by a weight 17. This weight is caught up by a stop 25 by a bearing 19 attached to the monkey. Through a screwed joint the channel 16 is now connected to the channel 20 (Fig. 5). If the monkey 13 is down, the steam distributor 9 is held to the left by the weight 17 and connects the channel 20, which opens into the steam inlet pipe 5, with the channel 16. The steam can pass out of this channel 16 through the D of the steam distributor 9 into the space 10 over the regulating piston 2, pressing down the latter so that the steam can pass into the cylinder space 1, causing the monkey to rise. When the monkey has been lifted a little the steam distributor moves to the right, because the weight is lifted by the bearing 19 and the spring 22 relaxes, and connects through its D the space 10 with an exhaust opening 14 (Fig. 2), by which means the regulating piston 2 is again reversed and the monkey falls. But together with the monkey there falls also the bearing 19 and the weight 17, moving the steam distributor once more to the left as soon as a certain depth has been reached, whereby the regulating piston 2 is again directed downward and the steam can enter the space 1 to catch up the falling monkey. The

connection 24 between 18 and 19 is in the form of a wire rope or a chain, because it must move aside, for the rising monkey reduces the distance between 18 and 19.

5 The steam distributor 9 (Fig. 6) consists of two half cylinders 26 and 27, the lower one 27 of which carries the D for the connecting of the steam channels, the upper half serving to press down the lower half against the steam pressure. 10 This is effected as follows: The slide valve rod presses apart the two halves of the steam distributor with its cone 21 through the action of the spring 22 which lays itself against the casing of the steam distributor and so presses the two 15 halves of the distributor apart with the help of the cone, whilst at the same time the spring 22 causes the return movement of the steam distributor when the latter has been moved to the left by pulling the rope 15.

20 In Fig. 6 the part 9 of Figs. 1 to 5 is represented more in detail in a somewhat clearer separate drawing, i. e., the steam distributor 9 of Figs. 1 to 5 is developed in accordance with Fig. 6. The essential point of the application is that by 25 the regulating piston 2 within the piston rod 12 all harmful space is avoided, the ring space 10 Fig. 3 in the hollow piston rod being always under steam pressure below the upper regulating piston, and further the connection for the steam over the channel 8 28 to the steam distributor 9 and, according to the position of the latter, to the channel 23 and the space 10 being given through the openings 11 conjointly with the ring channel 7. In this way the steam is enabled to strike the 30 upper regulating piston from above, whereby it is led through the working piston 29.

The distance to which the monkey can rise is in this invention adjustable to any desired height by several exhaust openings 14 in the monkey, 40 whereby, as indicated in the drawings, those exhaust openings that are not required may either be open or closed. In the former case the lowest opening, which is reached first by the working piston 29 would determine the height the monkey 45 would rise.

PAUL PFEIFFER.

PUBLISHED

P. PFEIFFER

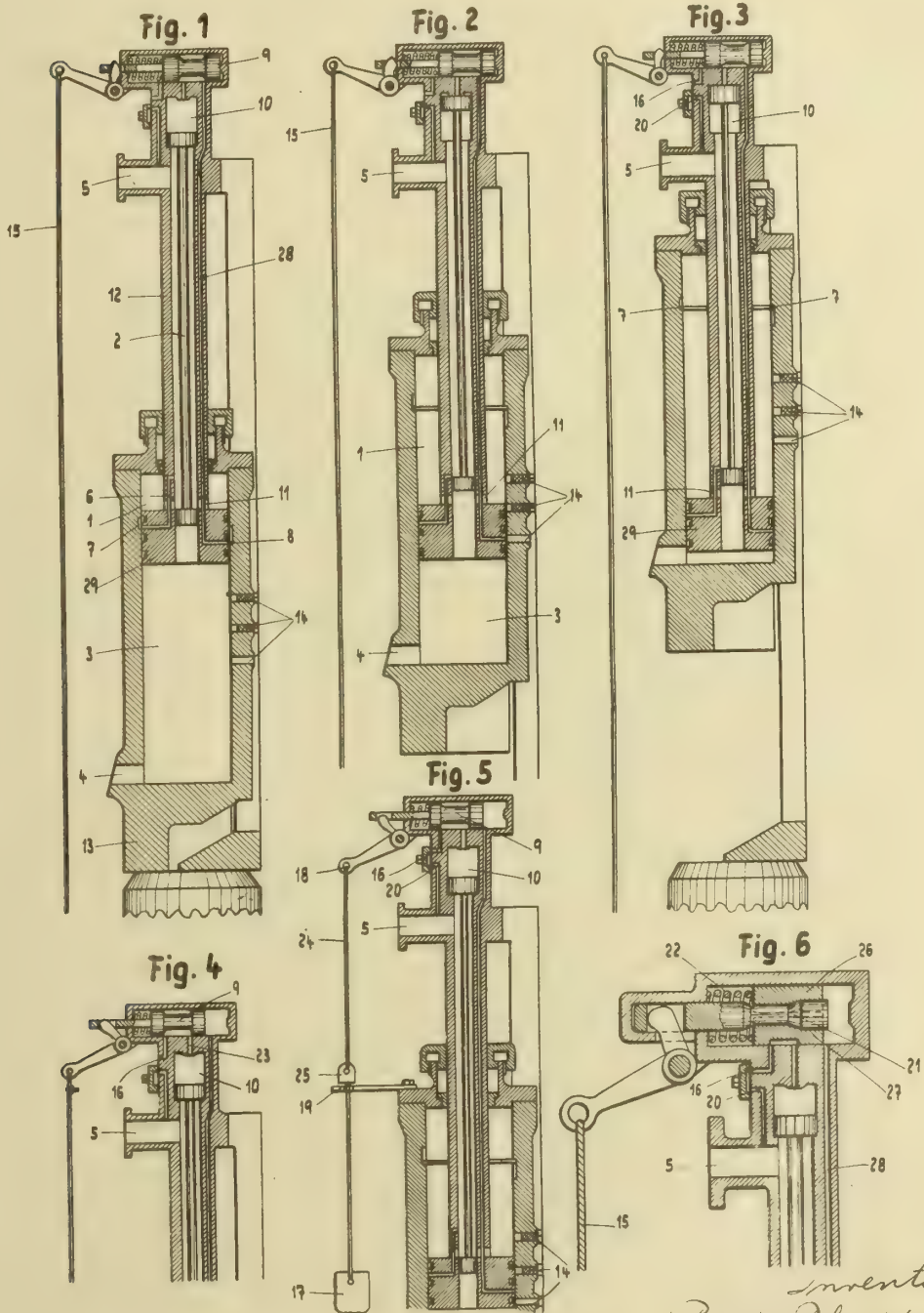
Serial No.

APRIL 27, 1943. REGULATING DEVICE FOR PILE-DRIVER MONKEYS

357,993

BY A. P. C.

Filed Sept. 23, 1940



Inventor,
Paul Pfeiffer,
By Frank S. Applesman,
Attorney.



ALIEN PROPERTY CUSTODIAN

DYEING CELLULOSE ESTERS

Robert Schnegg, Dormagen, Germany; vested in
the Alien Property Custodian

No Drawing. Application filed September 27, 1940

The present invention relates to the art of dyeing cellulose esters, and more especially, to a process for dyeing shaped articles like fibres, films, bands, and so on of highly acetylated cellulose. i. e. cellulose acetate having an acetate content of above 59%; such cellulose acetates are for the most part soluble in chloroform.

It is known that highly esterified cellulose acetate is not easily dyed even with such dyestuffs which are usually employed in dyeing the lower cellulose acetates. The same holds true when trying to increase the affinity of highly esterified cellulose acetate towards other dyestuff classes, for instance, acid wool dyestuffs by animalizing. This great resistance of highly esterified cellulose acetate to all kinds of dyestuffs is presumably due to the fact that the articles manufactured therefrom possess a rather horny surface free of pores which would allow the dyestuff particles, which are mostly high molecular, to wander into the interior.

It is known that similar difficulties, but on a lesser scale, are encountered when dyeing common acetate artificial silk which is less highly esterified and is soluble, not in chloroform, but in acetone, and that it has been tried to overcome the difficulties by adding certain swelling agents to the dye-baths for such artificial silk.

However, when trying to apply the processes used in dyeing acetone-soluble acetate artificial silk to the problem in question, the result is not successful. It was rather unexpected, therefore, when I found that nevertheless also articles from highly esterified cellulose acetate can be very easily dyed when the articles are previously brought into a highly swollen condition and are dyed in this state. In order to achieve this result, I have found it to be necessary to treat the articles with at least 40% aqueous acetic acid or a swelling agent of at least equal swelling action; furthermore, it is preferable to carry out this swelling treatment at high temperatures, for instance, temperatures of above 50° C. It may be noted that under such conditions the common acetone-soluble artificial silk is completely dissolved or at least destroyed to an extremely high degree. Contrary thereto, the mechanical properties of the articles of highly esterified cellulose acetate, for instance, resistance to break and elongation at break, are practically unimpaired by the present process.

After the treatment with one of the swelling agents, the articles can be dyed directly in deep and full shades; the dyeings so obtained have good fastness properties. It is especially pos-

sible to dye animalized articles after the said swelling treatment with acid wool dyestuffs and to obtain dyeings of excellent fastness. Before dyeing, the swelling agent may be removed from the articles by washing with water, without practically losing the property of being easily dyed. This property is only lost when the articles are dried before dyeing.

I have now furthermore found that by a suitable treatment it is even possible to dry the articles having been treated with one of the above strong swelling agent in a manner that they retain the property of being easily dyed. In order to achieve this result, I treat the articles which have been brought into the strongly swollen condition, if desired after removal of the swelling agent by washing, with a fixing agent selected from the group consisting of aqueous solutions of salts of organic or inorganic acids and wetting agents, which are free from sulphonic acid groups; these fixing agents may be employed alone or in admixture with each other. Apparently by this treatment the swollen condition of the cellulose acetate articles which is necessary for their being easily dyed is fixed to some extent. After the said fixing treatment the articles may be dried. They remain easily dyeable thereafter and may be stored for any length of time or shipped to the customer without being impaired with regard to their dyeing properties. If before or during dyeing the fixing agents are washed out from the articles, the cellulose acetate will again pass into the unswollen state whereby the dyestuff particles are very strongly fixed in the interior of the material so that the dyeings produced in this way show excellent fastness properties. For instance, dyeings with acid wool dyestuffs on animalized cellulose material having been produced according to my invention are faster in many respects, for instance, against fulling and washing than the same dyeings on wool. As I have mentioned in several instances, the process according to my invention is of special value in dyeing animalized material of highly esterified cellulose acetate with acid wool dyestuffs. Such material is produced in known manner, for instance, by incorporating basic substances like nitrogen bases with the material, for instance, by adding a suitable nitrogen base to a spinning solution for artificial fibres from highly acetylated cellulose. It is possible in this way, for example, to prepare artificial fibres from cellulose having an acetic acid content of above 59% which can be dyed alone or together with wool in equal shades as wool. For example, cellulose triacetate fibres are prepared

which contain a basic nitrogen containing resin, the fibres are treated with at least 40% aqueous acetic acid or a swelling agent of similar strength, are then treated with one of the above mentioned fixing agents and thereupon dyed with an acid wool dyestuff. The fibres may then be worked up into a mixed fabric together with wool and, by aftertreating with the same dyestuff, may be uniformly dyed. It is self-understood that in a similar way two-colored effects may be produced. It is furthermore possible to work up animalized cellulose triacetate fibres together with wool to slivers, yarns, skeins, fabrics and so on, and to treat these materials with a swelling agent which will not impair the wool. Thereupon the materials may be dyed in one or the same bath in uniform shades with acid wool dyestuffs. As above mentioned the fastness of the dyeings on the cellulose acetate articles surpass that of the same dyeings on wool, especially as regards the fastness to washing and fulling.

Of course the process is also applicable to textile printing. For instance, a fabric from cellulose triacetate fibres or animalized cellulose triacetate fibres may be printed with one of the above strong swelling agents and thereupon may be dyed with a suitable dyestuff, if desired, after having been treated with one of the said fixing agents. In both cases dyed patterns on a white ground or vice versa may be obtained.

Example 1

Fibres which have been prepared from chloroform-soluble cellulose acetate (acetic acid content: 59–61%) according to a wet-spinning process are continuously passed through a bath containing 60% aqueous acetic acid. The fibres swell strongly. Thereupon the fibre bundle is deacidified by washing with water and dyed with a water insoluble cellulose acetate dyestuff. By using, for instance, Cellit Fast Blue B (Schultz, Dyestuffs Tables, 1st suppl. vol., 1934, page 75), a deep blue shade is obtained whereas without the said swelling treatment the fibres are practically not dyed.

When trying to treat common acetate artificial silk (acetic acid content: 54–55%) in the same way, the fibres are completely dissolved.

Example 2

Fibres swollen and washed as described in example 1 are cut into staples and brought into a bath containing 10–30% of an inorganic or organic salt. The following salts, if their solubility permits so, may be used: chlorides, bromides, iodides, sulfates, nitrates, borates, phosphates, sulfites, thiosulfates, thiocyanates of the alkali and alkaline-earth metals, furthermore, alkali and alkaline-earth metal salts of the lower fatty acids, and mixtures of the said salts. After the swollen fibres have been treated for 5–10 minutes in a salt bath, for instance, a 20% solution of common salt, they are centrifuged and dried. After shortly washing the fibres are dyed as usual with cellulose acetate dyestuffs, for instance, Celliton Fast Black BTN (Schultz, Dyestuff Tables, 1st suppl. sol., 1934, page 76). Contrary to the untreated fibres, they are dyed in deep and full shades.

The usual softening and finishing agents may be added to the salt bath.

Example 3

Instead of a salt bath as described in the foregoing example, there may be used an aqueous solution of 5–50 g per litre of a wetting agent which

is free from sulphonic acid groups, for instance, a reaction product of a reactive tertiary amine with the anhydride of a substituted succinic acid, or a condensation product of oleyl alcohol or of castor oil with an excess of ethylene oxide.

Example 4

Fibres having been subjected to a swelling treatment as described in example 1 are aftertreated with a bath containing 2–10% of a salt and 0.05–0.5% of wetting agent which is free of sulphonic acid groups. The results are similar to those obtained according to examples 1–3.

Example 5

Cellulose acetate artificial silk (acetic acid content: 59%) prepared by a dry spinning process is treated in skein form for 15–120 seconds at a temperature of 30° C in a 50% aqueous acetic acid. After having been washed with water, the silk is dyed with Celliton Fast Black BTN in a deep black shade, whereas the untreated silk is hardly dyed. Of course, it is possible to add an aftertreatment of the swollen fibres as described in examples 2–4.

Example 6

To a raw solution of cellulose triacetate, there are added 5–15% (calculated on cellulose acetate) of a reaction product of starch benzene sulfonate with an amine as described in the application — and the solution is spun into fibres. In spite of the presence of the nitrogenous compounds, these fibres are but scarcely dyed with acid wool dyestuffs.

The fibres are then continuously passed through a bath containing 60% aqueous acetic acid at a temperature of 20° C for 15–120 seconds, thereupon washed with water and are dyed, while still wet, with acid wool dyestuffs, for instance, Amido Yellow E (Schultz, Dyestuffs Tables, vol. 1, 1931, No. 16). The deep dyeings obtained in this manner are especially distinguished by their fastness. For example, the fastness against fulling is 4–5 (Norman der Deutschen Echtheitskommission 1935), whereas a corresponding dyeing on wool has a fastness against fulling of 1–2. A series of other acid wool dyestuffs act in the same way, for instance, Quinoline Yellow (Schultz, Dyestuffs Tables, vol. I, 1931, No. 918), Brilliant Crocein B (Schultz, Dyestuff Tables, 1st suppl. vol., 1934, No. 539), Alizarine Rubinol R (Schultz, Dyestuff Tables, vol. I, 1931, No. 1210), Wool Fast Violet B (Schultz, Dyestuff Tables, vol. I, 1931, No. 974), Alizarine Direct Blue A (Schultz, Dyestuff Tables, vol. II, 1932, page 9), Azo Acid Black 3 BL special (Schultz, Dyestuff Tables, 1st suppl. vol., 1934, page 70), and so on.

Example 7

A solution of cellulose triacetate in glacial acetic acid is mixed with an animalizing agent, for instance, a reaction product of chlorinated paraffin with ethylene diamine, and is spun by the wet-spinning process; the fibres obtained therefrom are swollen in a 60% aqueous acetic acid at 60° C for 15 seconds washed with water, and treated for 5 minutes in a salt bath containing 5% sodium acetate, 2% ammonium thiocyanate, 2% of a finishing agent and 0.5% isododecenyl-succinic acid-diethyl amino-methyl ester. The centrifuged and dried fibre is excellently dyed by acid wool dyestuffs.

Example 8

A fibre bundle of cellulose triacetate being animalized as described in example 6 is swollen

for 30 seconds at a temperature of 10° C in a 65% aqueous acetic acid which contains about 2% of a chromium compound, for instance, sodium bicromate or chromium acetate and, if desired, a reduction agent like formaldehyde or glucose. The bundle is freed from acid and cut into staples. The fibres are after-treated in a salt bath (containing 8% sodium acetate, 1% of a wetting agent free of sulfo groups and 2% of a usual preparation), dried and worked up with wool to a yarn or textile fabric. The mixture is uniformly dyed with acid wool dyestuffs. Especially suitable are chromable dyestuffs. The dyeings on the artificial fibres are not only of the same fastness to washing, fulling and perspiration, but are equal to the dyeings on pure wool regarding the fastness to light.

Example 9

Triacetate artificial silk containing an animalizing agent is worked up with wool in the relative proportion 1:1. The mixture is treated in a bath containing 60% aqueous acetic acid and 2% glucose for 15 seconds at 20° C, centrifuged, washed and dyed in the wet state with wool dyestuffs such as, for example, Anthralane Blue B (Schultz, Dyestuff Tables 1st suppl., vol., 1934, page 68). The dyeings obtained are uniform on both kinds of fibres. Dyeings of particular fastness are obtained by using salts of the acid sulfuric acid esters of leuco vat dyes, which also dye both kinds of fibres equally and with the same fastness properties.

Example 10

On working as described in example 9, but inserting, after swelling, a salt treatment, similar dyeings are obtained as those of example 9.

Example 11

A fibre produced as described in example 8 is dyed with a water-insoluble cellulose acetate dyestuff, for instance, a Celliton Fast Dyestuff. By the presence of the animalizing substance, the affinity of the triacetate against such dyestuffs is not as one should have believed, diminished, but even considerably increased, so that, for instance,

the dye baths are almost completely exhausted and the dyeings are deeper than on acetate artificial silk having an acetic acid content of 54-55%.

Example 12

Fibres of chloroform-soluble cellulose acetate produced by the dry- or wet-spinning process are locally printed with 60% aqueous acetic acid, if desired, in the presence of a thickening agent and thereupon dyed, or treated with salt and after drying dyed with cellulose acetate dyestuffs at 70-80° C. Thereby fibres are obtained which show interesting two-colour effects, because the untreated places do not or practically not absorb the dyestuff, whereas the treated fibres absorb the same very strongly.

Example 13

Fibres of triacetate having incorporated therein with an animalizing agent are spun and treated as described in example 12. Flamed fibres may be obtained with cellulose acetate dyestuffs or with acid wool dyestuffs, chrome dyestuffs and so on.

Example 14

A fabric prepared of cellulose triacetate fibres is printed in patterns with a paste containing 65% aqueous acetic acid, washed and dyed, or washed, treated with a salt as described in example 7 and then dyed. With suitable dyestuffs, for instance, with Cellit Fast Blue B, dark patterns on a white ground are obtained.

Example 15

A fabric of triacetate artificial silk having incorporated an animalizing agent is printed as described in example 14. On dyeing with cellulose acetate dyestuffs, similar effects as in example 14 are obtained. By dyeing with acid wool dyestuffs or with chrome dyestuffs which reserve acetate silk, coloured patterns on a white ground are obtained.

This application is a divisional of application Ser. No. 275,399.

ROBERT SCHNEGG.

towards the bottom of the tank by means of the paddle-wheels and is recirculated as stream 15. This current 15 carries particles of hydrate of alumina which are thus transported towards the front end of the basin or tank 12. There the stream is deflected again viz. towards the main stream 14. By this alteration of direction of the current continuously crystallization centers or nuclei are added to the fresh stream of solution whereby the precipitation of the hydrate is accelerated.

The tank 12 has a bottom 24, side walls 25, 26 and a front wall 27. The discharge end of the basin is not shown in the drawing. Inside the basin the paddle-wheels 16 to 19 are arranged. The number and arrangement of these paddle wheels inside the tank can, of course, be varied in wide limits. Across the basin 12 are shafts 28 which may be supported on columns 29. In the shaft 28 is a sprocket 31 which is driven by a chain 32 and a sprocket 33 from the geared motor 34. The shaft 28 of the paddle-wheel 16 is provided with another sprocket 37. From this sprocket the sprocket 39 and the shaft 28 of the next paddle-wheel 17 is driven by a chain 38. In this way a single motor can be used for driving all paddle-wheels.

The shaft 28 of the paddle-wheel 16 is pro-

vided with several arms 40, 41 which carry the opposite paddles 42, 43. The paddle wheel 16 consists of several such units which are designated with A, B, C, D, E. Each paddle has diagonal reinforcing elements 44 which assist in the mixing procedure. The agitator mechanisms 16, 17, 18, 19 are of the same design with the only difference that the paddles of the subsequent mechanism are staggered by 90°. The paddles of the mechanism 17 may be somewhat narrower than those of mechanism 16. In the same way also paddles of mechanism 18 may be narrower than those of the mechanism 17 and those of the mechanism 19 narrower than those of the mechanism 18.

Preferably the feed openings 23 should not be located lower than the horizontal plane in which the shafts 28 are situated. If these openings were located at a low level the incoming stream of solution would collide with the returning circular stream.

The agitating mechanisms have to be arranged sufficiently close to the bottom 24 so that no settling of particles on said bottom may occur which may counteract the circular flow of the liquid.

HANS TIEDEMANN.

PUBLISHED

H. TIEDEMANN

Serial No.

APRIL 27, 1943. DECOMPOSITION OF SODIUM ALUMINATE LIQUOR

359,350

BY A. P. C.

Filed Oct. 2, 1940

Fig. 2

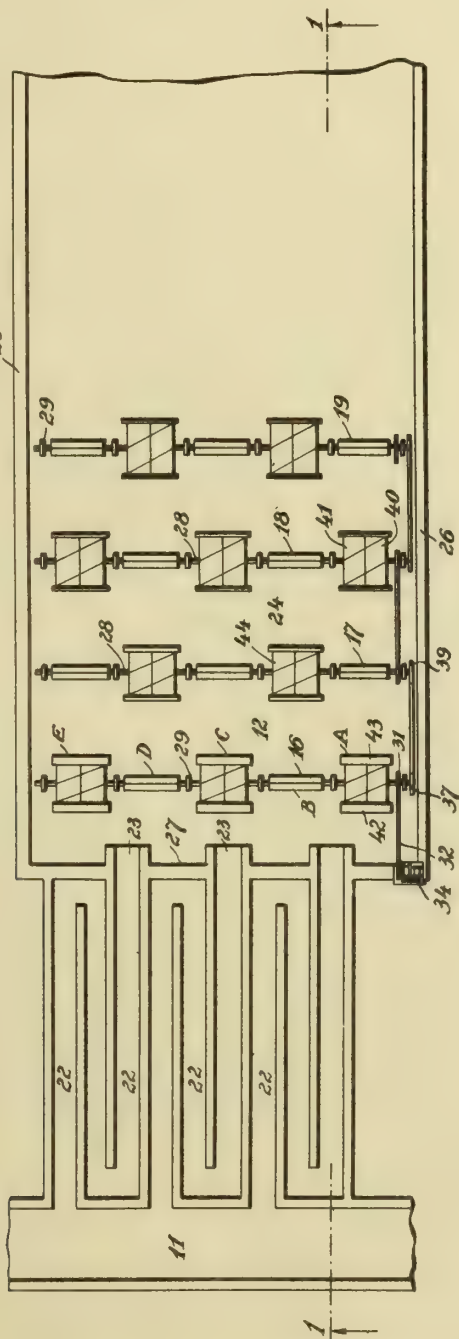


Fig. 1

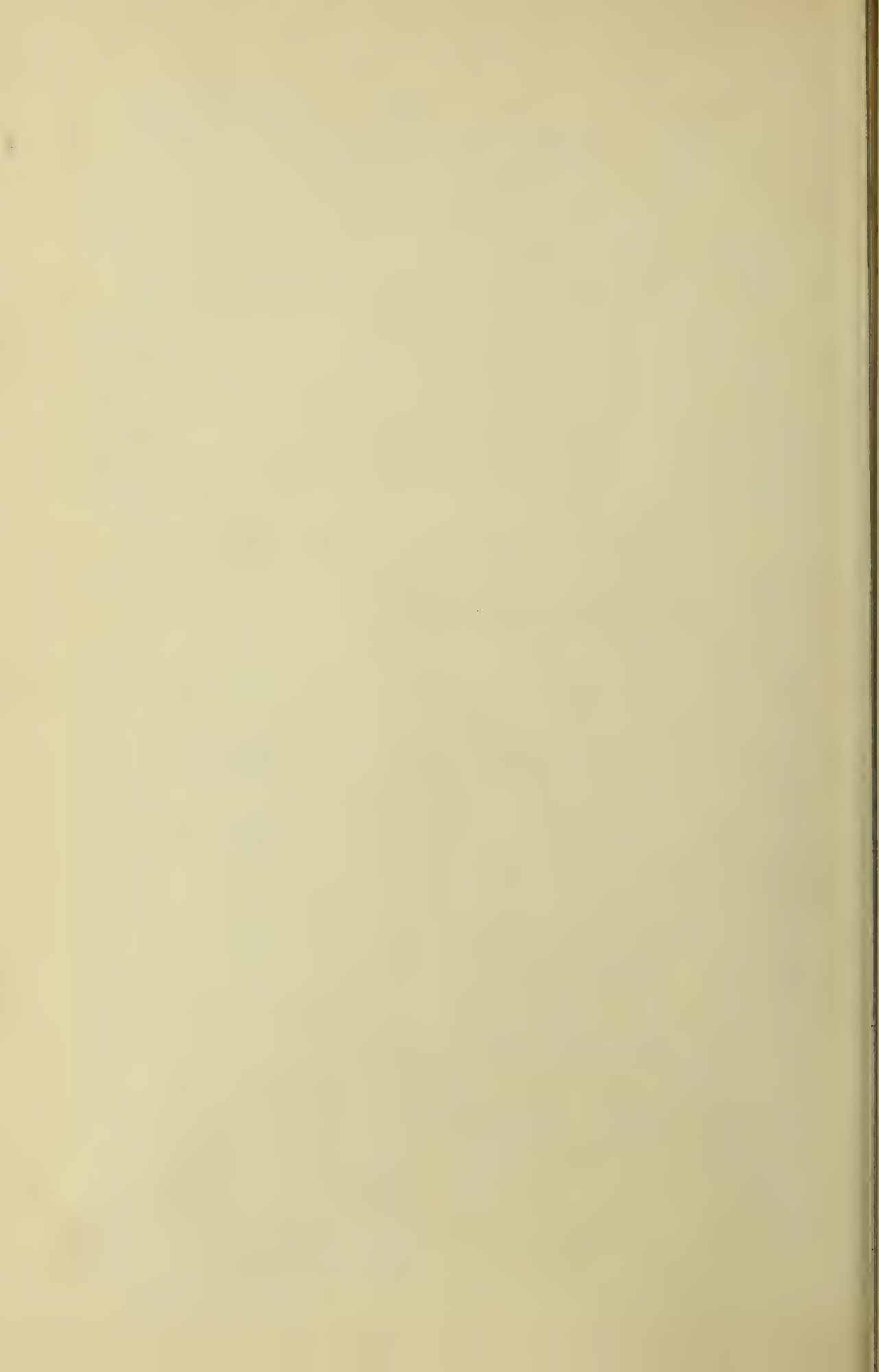


BY

INVENTOR:

Hans Tiedemann

J. Freeman
ATTORNEY.



ALIEN PROPERTY CUSTODIAN

PINS FOR TEMPORARY FASTENING OF
BUTTONS

Thea Stumpf, Francfort-on-Main, Germany;
vested in the Alien Property Custodian

Application filed October 2, 1940

This invention relates to improvements in pins to be used for the temporary fastening of buttons when fitting or trying on various articles of wearing apparel.

In United States Letters Patent No. ———, 5 granted ———, upon application Serial No. 263,662, filed March 23, 1939, of which the present application is a division, there are disclosed pins to be used for temporary fastening of buttons when fitting or trying on various articles of wearing apparel. 10

It is most important, when trying on an article of wear, to first temporarily fix the buttons belonging to it perfectly in the desired position, and in such a manner that they can easily be removed and replaced by other buttons of a different shape if necessary. By this means the choice of the most suitable button is greatly simplified, and the same can then be sewn on in the exact position required, when the fitting is finished. 20

The temporary fastening and easy changing of buttons, when trying on or fitting articles of wearing apparel, is the aim of this invention, which is in the form of a pin with a shaft bent 25 at the upper end in rectangular form, with a catch for a button with two or more holes, the buttons thus temporarily fixed being intended to be sewn afterwards, in the usual manner, on the article of dress in question. 30

For a more complete understanding of the invention there will now be described, by way of example only and with reference to the accompanying drawings, several forms of temporary fastening according to the present invention.

In these drawings:

Fig. 1 represents a side elevation of the pin of this invention, showing the temporary fastened button with holes;

Fig. 2 is a side elevation of the invented pins for fastening a button with four holes and

Fig. 3 is a perspective view of the pin following Figs. 1 and 2.

The pin 1, as shown in Fig. 1, is intended to temporarily fix buttons with two holes, B, when trying on articles of wearing apparel. The upper end 2 of the shaft of the pin 1 is bent in rectangular form, and is provided at the end of this with a suitably constructed catch 9, see Fig. 3, which keeps the button B with the two holes temporarily in position after the pin has been stuck into the material in the usual way.

When a button has four holes, C, the shaft of the pin 1 can be provided with two catches at different angles to each other, or two pins, 1—2—9, can be used to temporarily fasten a button with four holes, C.

THEA STUMPF.



PUBLISHED

T. STUMPF

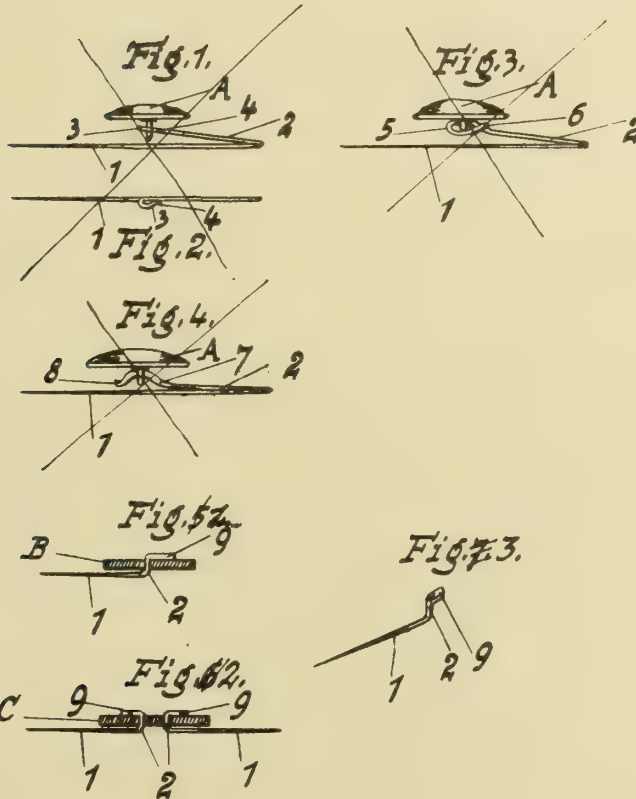
Serial No.

APRIL 27, 1943. PINS FOR TEMPORARY FASTENING OF BUTTONS

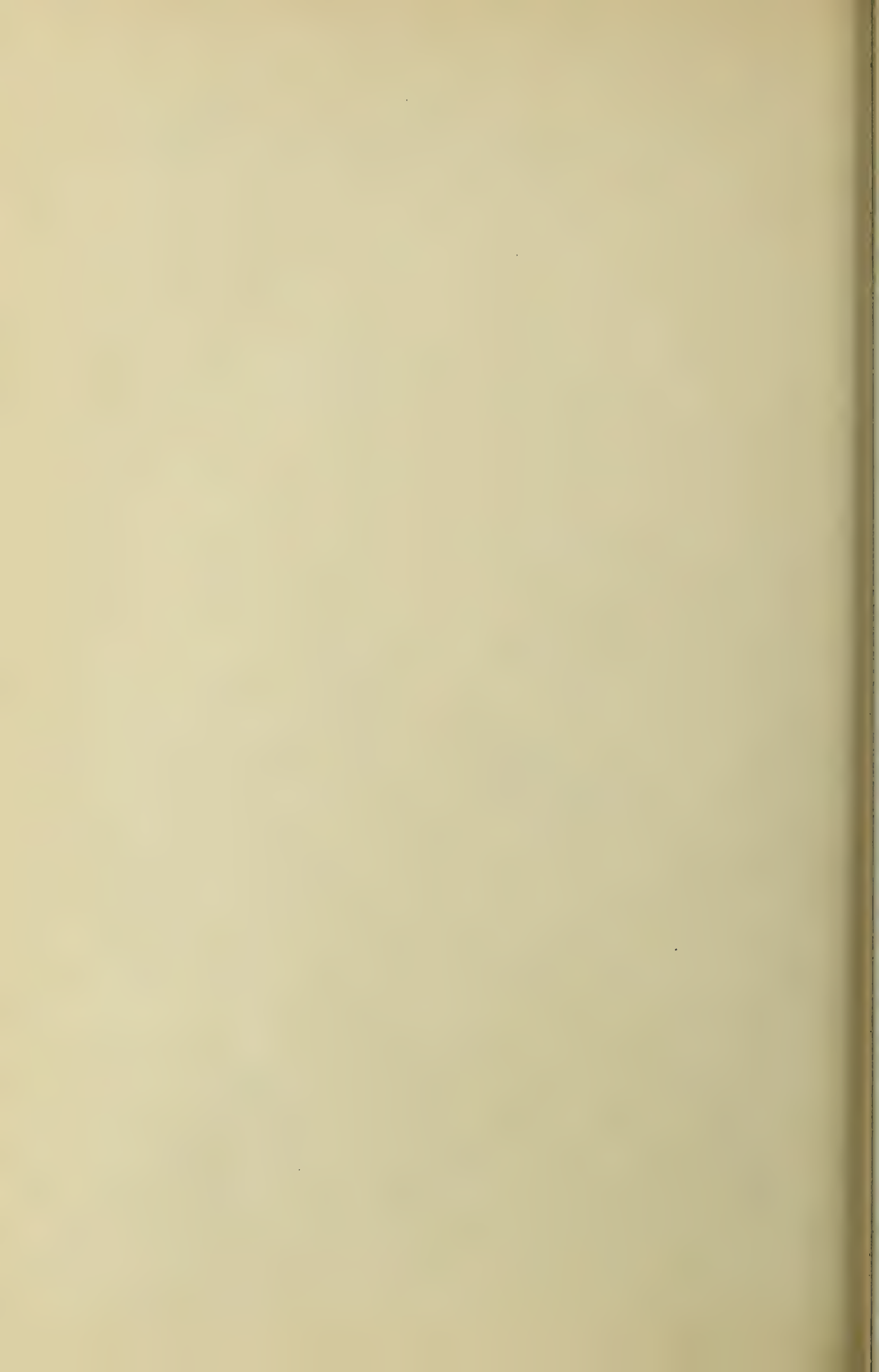
359,453

BY A. P. C.

Original Filed March 23, 1939



Inventor:
Thea Stumpf



ALIEN PROPERTY CUSTODIAN

CHRONOMETRIC ELECTRIC CIRCUIT

Renato Di Giuseppe, Rome, Italy; vested in the
Alien Property Custodian

Application filed October 4, 1940

The present invention relates to an electric circuit, adapted to be used as a time measuring device, and which may be realized as a clock having index fingers indicating hours, minutes and seconds.

It is already known that a deferred control may be obtained by means of a condenser inserted in a relay circuit so arranged as to continue its operation by means of the discharge current, on to a commutator or contact breaker, until the intensity of such current of discharge has fallen below a certain pre-determined value.

According to the present invention, use is also made of the condenser, but the circuit is so arranged that the relay operating the commutator or contact breaker to be controlled, operates during the charging of the condenser until the charging current, depending from a constant tension, falls below a certain predetermined value; the system of time-delay control so obtained being used in conjunction with means adapted to repeat periodically the operation at pre-determined intervals of time, always equal to each other.

The invention comprises essentially an electric circuit in which are inserted two or more contacts controlling a relay of normal type, a condenser traversed by a current of sufficient intensity for maintaining attracted said relay during a predetermined time, said relay being inserted on a key adapted to open one of the contacts for starting the charge of the condenser, and adapted to close the other contact which re-establishes the circuit in place of the key.

The invention comprises also the feeding with alternate current, and devices for disposing the antagonistic force of the relay, so as to withdraw it from the action of the stationary current, for the purpose of effecting the attraction of the relay only during the transitory period of the current, and in order to cause the device to be independent from the variations of the tension.

Lastly, the electric circuit according to the invention, provides essentially the driving element for the measure of time, operating on the principle of the time variation of the charging current of a condenser in the time, assuming the time in which the charging current falls to the minimum to maintain the relay attracted as unit of measure.

The device according to the invention is shown schematically in various forms of realization and by way of example in the attached drawing, in which:

Fig. 1 shows an electric circuit comprising a relay, two contacts, a condenser and a key.

Fig. 2 shows a complete circuit for effecting the calibration of the time of operation of the device.

Fig. 3 shows a circuit similar to an ordinary rotating telephone circuit finder.

Fig. 4 shows a circuit in which a relay is attracted immediately on insertion, and remains attracted for a given time after having been switched off. (Time-delay dropout relay).

Fig. 5 shows a circuit similar to that shown in Fig. 4, predisposed so as to compensate eventual variations of tension of the feeding current.

Fig. 6 shows a circuit similar to that shown in Fig. 5, comprising a time-delay relay which is energized after a determined time from its insertion, said activated condition ceasing immediately upon its disconnection. (Time-delay pickup relay.)

Fig. 7 shows a circuit similar to those illustrated on Figs. 5 and 6, but provided with a time-delay relay retarding its action both on its insertion and on switching off. (Time-delay pickup and dropout relay.)

In Fig. 1, 1 indicates a relay of ordinary type, which actuates, when is energized, two contacts 2 and 3, shown in the figure in a de-energized position, 4 is a condenser having such a capacity that when the circuit is fed with constant tension, it is traversed by a charging current which is sufficient to maintain attracted the relay 1 for a certain time.

The operation of the device shown in Fig. 1 is as follows:

On pushing momentarily the key 5, the relay 1 becomes inserted and is thereby energized, for operating its two contacts 2 and 3. The contact 2 opens, starting thereupon the charge of condenser 4; the contact 3 closes, thus maintaining closed the circuit in place of key 5 which re-opens immediately.

When condenser 4 has been charged until the charging current has dropped below the necessary minimum value for keeping attracted relay 1, this latter ceases its action on the contacts 2 and 3; contact 3 opens thereby switching off the circuit of the device, contact 2 closes, thereby discharging condenser 4 and predisposing it for the subsequent operation.

By selecting suitably the electrical characteristics of relay 1 and of condenser 4, the time in which relay 1 is maintained attracted is constant for a given tension, and consequently the complex may be used as a time measuring device.

The circuit shown in Fig. 1 may be completed

by the addition of adjustable resistances 6, 7 and of condensers 8 and 9, as shown in Fig. 2. The calibration of the operating time of the complex may be effected either by operating on the adjustable resistances 6 and 7, or on the variable condensers 8 and 9. All the variable elements 6, 7, 8 and 9 above mentioned, may in their turn be replaced with inductances, both constant or variable, with or without iron core, and connected to them either in series or in parallel.

If from the circuit shown in Fig. 1, the contact 3 is excluded, and the key 5 is maintained permanently closed, the circuit of relay 1 will close and open at constant intervals of time, equal to the time of operation of the complex.

By applying in the last mentioned case, the contact 3 of the relay 1 in the circuit illustrated in Fig. 3, which is similar to an ordinary telephone circuit finder, the toothed wheel 11 will advance through a tooth at every insertion of relay 1 and consequently of the servomotor 10.

On closing key 5 for a time t (Fig. 3) the displacement of index finger 12, integral with the wheel 11 records on dial 13, the measure of the time t .

By calibrating the time interval of the chronometric circuit for the time of one second, providing wheel 11 with sixty teeth, and connecting mechanically index finger 12 with another two index fingers with successively reduced angular movements from 60 to 1 (using ordinary clock gearings) a clock is realized, having hours, minutes and seconds index fingers. In this case, the clock setter or adjustment device may be provided by using one or more of the variable elements above described, shown in Fig. 2.

In order to cause the time of operation of the device to be independent, within certain limits, from the tension of the feeding current, it is sufficient to substitute the usual antagonistic spring of relay 1, with an electromagnetic force, proportional to the tension of the feed current, as shown by way of example in Fig. 5, which shows the relay 1, formed as an E shaped core provided with two windings 14 and 15, the moveable anchor 16 being balanced on a pivot between two core expansions as hereinafter described.

By replacing the dial 13 with a series of contacts, and the index finger 12 with a sliding brush operating with said contacts, the time registration may be effected through suitable electric devices, such as lamps, relays and the like.

By applying on the relay 1 more contacts (besides the contacts 2 and 3), it is possible to insert, during the operation of the chronometric circuit, any other circuit or electric apparatus, so as to obtain the chronometric registration in other ways. By means of such auxiliary contacts and relays, it is possible to insert a plurality of chronometric circuits in series, calibrated either to give equal times or to provide times different one from the other.

The preceding description of the arrangements of circuits according to the invention, applies also when the circuit shown in fig. 1 is fed with alternating current, provided that use is made of suitable appliances.

Fig. 4 shows schematically a circuit so arranged

that the relay provided in it is attracted immediately upon its insertion, and continues to be attracted for a determined time after having been switched off (Time-delay dropout relay). In such circuit, the relay 1 is energized immediately on closing key 17, while condenser 18 is short circuited by said contact key 17, and is thereupon discharged. When the circuit is disconnected, through the opening of contact key 17, the relay 1 continues to be traversed by the feeding current, until the value of said charging condenser current falls below a certain determined value.

Fig. 5 shows schematically a circuit similar to that shown in fig. 4, but provided with means adapted to compensate eventual variations of tension of the feeding current. These means, as above mentioned, consist in forming the relay on an E shaped core, comprising two windings 14 and 15, and on oscillating anchor 16 pivoted between said core windings, one of which may be inserted as the relay 1 shown in fig. 4, and the other may be shunted from the feed current with an adjustable resistance connected in series, thus acting as an antagonistic force.

With the arrangement just described, both the active force of the relay, depending from the charging current of condenser 18, and the antagonistic force which causes it to be disconnected, when said force decreases, are proportional to the tension of the current, i.e., they vary similarly as the variations of the latter, and consequently the operation of the device depends solely from the electric characteristics of the circuit, and so remains practically constant even during eventual variations of the current tension.

In the circuit shown in fig. 5, the rheostats 19 and 20 are used for adjusting, within certain limits, the time of the circuit.

Fig. 6 shows a circuit similar to that shown in fig. 5, with which however the opposite effect is obtained, i.e., a retardation of the activation of the relay (time-delay pickup relay). In this circuit, winding 14 is the active one, while winding 15 provides the antagonistic force; these two windings are so dimensioned that on pressing the key 21, the winding 14 is inserted, but the force produced by it is not sufficient for attracting immediately the movable anchor 16, and consequently a time t has to pass between said insertion and the actual attraction of anchor 16, after which the current charge of condenser 18, drops to such a low value, that the current traversing the winding 15 falls below and is overcome by that traversing the winding 14. Also in this case the time-delay depends on the values of condenser 18 and resistances 19 and 20.

The relay shown in fig. 6 has a quick return, viz; as soon as key 21 is released, the moveable balancer 16 is immediately attracted again by the winding 15.

The circuit shown in fig. 7 is a time-delay pickup and dropout relay. In fact, in this circuit, on pressing the key 21, the operation above described for the circuit of fig. 6 is obtained, and on releasing said key 21, the operation described for the circuit of fig. 5 is obtained. The two time-delays depend on the values of the condensers 18 and 23 and of the resistances 19, 20 and 22.

RENATO DI GIUSEPPE.

FIG. 1



FIG. 2

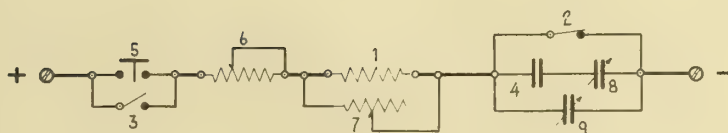
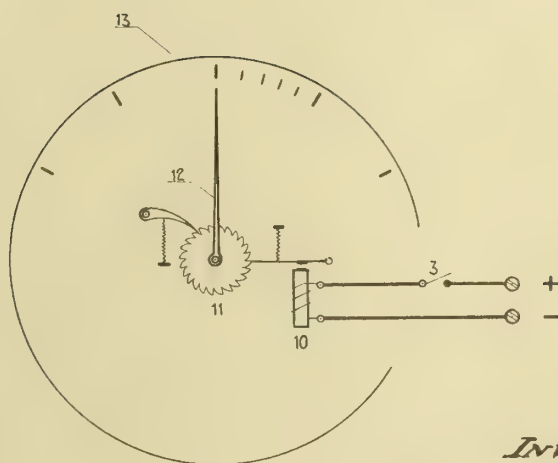
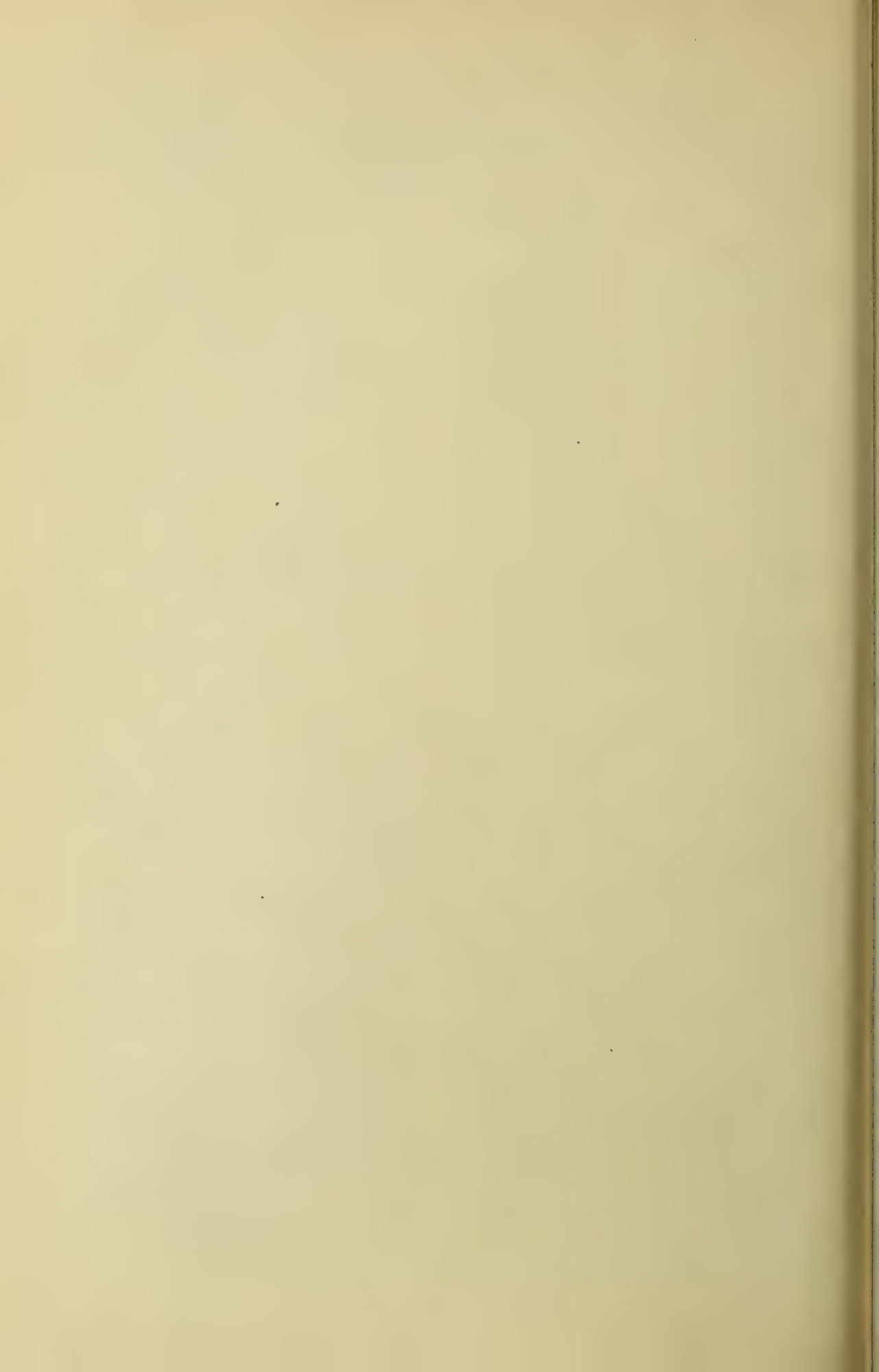


FIG. 3



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BY A. P. C.

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CHRONOMETRIC ELECTRIC CIRCUIT
Filed Oct. 4, 1940

Serial No.
359,791
2 Sheets-Sheet 2

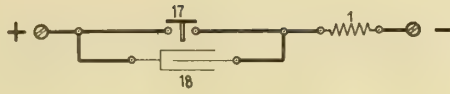


FIG. 4

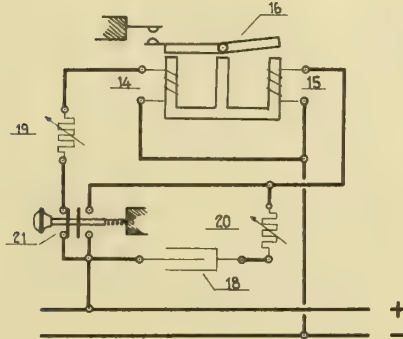


FIG. 5

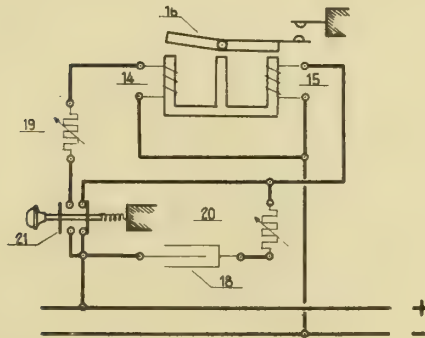


FIG. 6

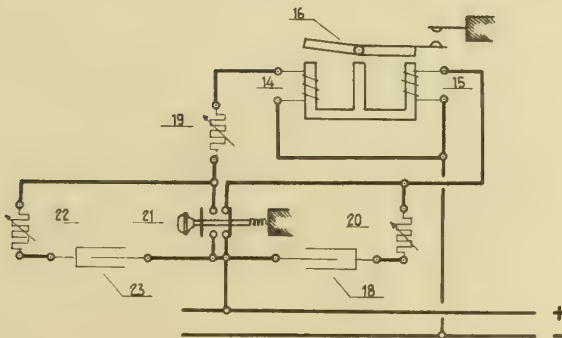


FIG. 7

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ALIEN PROPERTY CUSTODIAN

REMOVING WOODY MATTER FROM THE STEM FIBRES OF TEXTILE PLANTS

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Alien Property Custodian

Application filed October 5, 1940

The present invention relates to a process and to a device for removing the woody matter from the stem fibres of textile plants as ramie, hemp and others, starting from the dry or from the green stem as it is cropped; the invention allows also to operate on the field on which the plants are cultivated.

A device according to the invention is illustrated in a side view by way of an example on the accompanying drawing which shows its principal members and their operation.

The device shown consists mainly of two rollers *a* and *a'* having radial blades on their periphery and being driven by not represented rotating members with a continuous regular movement of rotation, as shown by the arrows of the drawing.

The rollers which are both positively driven are so supported that the upper roller *a'* may be approached to and removed from the lower roller for the purpose to allow a greater or smaller engagement between the blades.

The number of the blades and the speed of their rotation as well as the depth of engagement, are adapted to the quality and to the state of the textile plants to be treated and they are therefore variable factors.

The bundle *b* to be freed from the woody matter is fixed by means of a clip *c* to the arm *d*, articulated in *e* and guided in *f*, so that during the relation of the bladed rollers the bundle is brought forwards and then withdrawn by means of the oscillation of the arm *g* moved by an excentric mechanism indicated in *h* and receiving its continuous and regular rotating movement by not shown rotating members connected by a

joint with the main driving shaft, eventually driven by a pedal or by hand; alternatively the forward movement of the bundle could also be obtained manually.

To each evolution of the excentric *h* correspond a complete oscillation of the bundle *b*, which being moved with a smaller speed than the peripheral speed of the bladed rollers is trailed forwards by the blades, which break the woody matter and which on the return movement of the bundle separate and retain the broken woody parts.

The described cycle of treatment may be repeated until the bundle is well freed from the woody matter but this is mostly obtained already in the first cycle.

The device may be installed on an agriculture carriage and thus transported on the field on which the plants are cultivated.

It is to be understood that the invention is not limited to the form of execution illustrated only by way of example, but comprises on the contrary all the structural variations which are possible in realising the claimed proceeding, as, related to all the known stripping systems, the novelty of this invention mainly resides in the circumstance that only one mechanical device is used for introducing the bundle of plants in a forwards direction and for withdrawing it afterwards whilst the rotating parts of the machine are always moved in the same sense. This is the circumstance which permits the elimination of the woody matter.

LEONIDA ANTONELLI.

THE HISTORY OF THE

REPUBLIC OF THE UNITED STATES

OF AMERICA

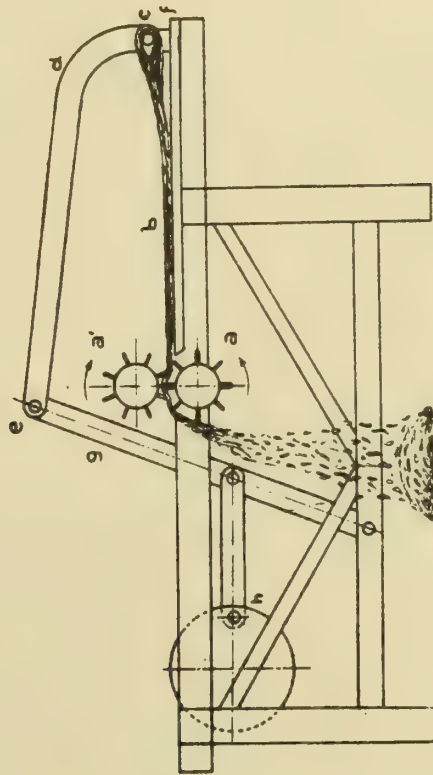
FROM 1776 TO 1876

The history of the United States is a story of growth and development. It begins with the first settlers who came to the New World in search of a better life. They found a land of opportunity, but also a land of conflict. The struggle for independence was a long and hard one, but in the end, the United States emerged as a free and sovereign nation. The years following independence were a time of rapid growth and expansion. The United States grew from a small colony to a great nation, covering a vast area of land and home to a diverse population. The story of the United States is a story of the American dream, of the pursuit of happiness and the promise of a better future for all.

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BY A. P. C.

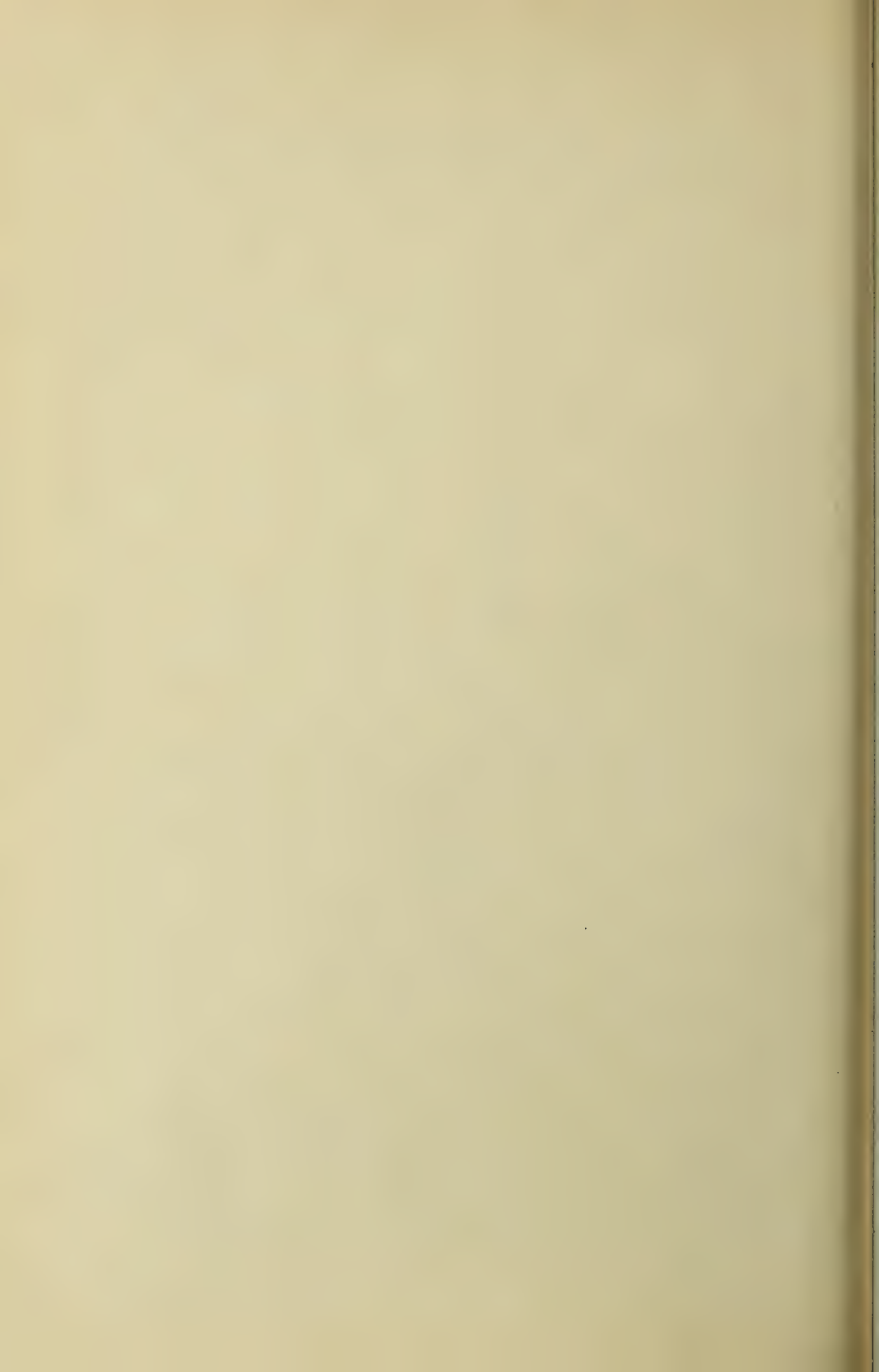
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REMOVING WOODY MATTER FROM THE STEM
FIBRES OF TEXTILE PLANTS
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38

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ALIEN PROPERTY CUSTODIAN

METHOD OF PRODUCING SOUND BAND MATRICES

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Application filed October 5, 1940

The invention relates to a method of producing sound band matrices by coating the original sound band with a liquid gelatinous substance or gelatinating albumins and, after the matrix substance has hardened, drawing off the so formed band-shaped coating from the original sound band. Coating the recorded surface of the original sound band with the matrix substance may, for example, be effected by means of a rotating roller partly dipping into a bath of the substance, said roller feeding the substance in a thin layer, either directly or by insertion of a feeding roller, to the surface of the original sound band.

The application of the matrix substance to the recorded surface of the original sound band is particularly difficult if this band consists of a wax band, because the slightest contact of the comparatively soft wax with a solid body will at least destroy the record, if it does not cause the wax layer to come off its base. But also in the case of original sound bands not having a sound record layer of wax, a direct contact of the surface of the original sound band with a solid body will impair the quality of the sound band matrix, in which connection it should be noted that in applying layers of a substance to bands, a direct contact between the band and the element feeding the substance was hitherto considered necessary for securing a uniform distribution of the substance on the band or for preventing the formation of air bubbles.

According to the invention, the uniformly thick layer of the matrix substance, which is continuously fed to the surface of the original sound band, moving at a uniform speed, is dammed by said sound band, preventing direct contact between the sound band and the element feeding the substance. This damming causes an accumulation of substance bridging over the space between the original sound band and the feeding element, which accumulation may be termed as damming wave, in other words: a small but definite quantity of substance uniformly distributed over the width of the original sound band is formed directly at the place of application, from which quantity the original sound band draws the substance required to form the matrix.

Especially if the original sound band has a recorded wax layer, it is advisable to mix the matrix substance with an addition reducing its surface tension, for example a soap solution or alcohol, in order that the substance should well enter even the smallest groove-shaped sound tracks.

The uniformity of the damming wave formed, which is maintained in the course of making the matrix as well as in the state of rest, is attained according to the invention by keeping the thickness of the gelatine layer or the like, fed to the place of application, smaller than the thickness of the layer of substance received by the original sound band, and by correspondingly increasing the feeding speed of the layer of gelatine supplied. As thorough experiments have shown, the proportion of the speed, at which the matrix substance is fed to the place of application, to the linear speed of the original sound band should preferably be made about 5 to 1.

In feeding the layer of the matrix substance to the place of application by means of a roller, it is advisable to keep the thickness of the layer of substance fed by the roller so small as not to exceed a few hundredths of a millimetre. Furthermore, the velocity of rotation of the feeding roller is preferably kept below the empirically determinable critical velocity at which the matrix layer has the tendency to accumulate on the central portion of the roller.

The space between the original sound band and the feeding roller, the velocity of this roller and of the band, and the thickness of the layer of substance fed by the roller should be adjusted so that, in the final result, a complete consumption of the substance fed without air bubbles is made possible by a most uniform application to the original sound band without the band touching the roller.

At the place of application, the original sound band is preferably moved in a direction opposite to that in which the matrix substance is fed.

For carrying out the method according to the invention, it is advisable to use the device for producing wax ribbons for mechanical sound recording purposes shown in the U. S. patent application "Method and device for producing wax ribbons for mechanical sound recording" of Richard Ruhnau, Berlin-Tempelhof, 30, Badener Ring (Germany) dated August 2nd 1940.

A constructional example for carrying out the method according to the invention is illustrated in the accompanying drawing in which:

Fig. 1 is a diagrammatical side view of a device for carrying out the method according to the invention,

Fig. 2 is a section through the device shown in Fig. 1 on the line II—II.

The gelatinous substance or the gelatinating albumin is liquefied in a vessel 1 by adding a solvent or is introduced in liquid state into the

vessel. Preferably, an addition reducing the surface tension, for example a soap solution or alcohol, is mixed with the substance.

A roller 3, hereinafter called bailing roller mounted to rotate on an arm 2 pivotally connected by a universal joint, partly dips into the bath and is rotated by a mechanically driven roller 4. A spring 5, attached at one end to the arm 2 and at the other end to a stationary part of the device, draws the bailing roller 3 towards the circumference of the roller 4. As will be seen from Fig. 2, the bailing roller 3 is provided at its circumference with a rather wide groove 6, the depth of which is so dimensioned that a sufficient quantity of the matrix substance will be permitted to pass between the rollers 3 and 4 and will be supplied to the roller 4.

The edge ribs 7 touch the straight generatrix of the roller 4.

The bailing roller 3, in its rotation, takes up matrix substance from the vessel 1 and transfers it to the upper roller 4. The film of the substance deposited upon the roller 4, hereinafter called feeding roller, is partly removed again by an adjustable knife-shaped stripping plate 8 and returned into the vessel 1. The rest of the layer of substance remaining on the feeding roller is free from air bubbles and partakes completely uniformly in the rotation of the feeding roller.

A roller 9, arranged opposite the feeding roller 4, serves to convey the recorded original sound band 10. The band conveying roller 9 is adjustable with respect to the feeding roller 4, and both rollers turn in the same sense. In operating the device, the band conveying roller is moved towards the feeding roller by means of a suitable shifting device so far as to cause the film of substance to slightly touch the band arriving in opposite direction whereby the liquid substance is dammed, thus ensuring the uniform transfer of the substance to the band.

The best results are obtained if, by means of the stripper 8, the thickness of the layer of substance is reduced to a few hundredths of a milli-

metre, and if the circumferential velocity of the feeding roller 4 is considerably increased with respect to the running speed of the band so that the circumferential velocity of the roller 4 and the running speed of the band are in the proportion of about 5 to 1.

It was found that the operating speed of the device is limited by the fact that the film of substance, if the roller 4 rotates too quickly, has the tendency to accumulate to an elevation in the centre of the roller, whereas the edges of the roller remain nearly free from the substance.

The optimum operating speed is easily found by experimenting, if regulating means are provided for the driving motor. It has also been found to be advantageous to arrange strippers at the roller 4 in such a way that any substance adhering to the sides of the rollers is also returned into the vessel 1, as it would otherwise lead to thickening of the edge portions of the matrix.

Finally, it was found advisable to make the width of the substance rollers 3 and 4 a little smaller than the width of the original sound band. The object of this is to prevent the liquid substance from running over the edges of the band.

It is preferable not to produce the matrix in one single operation, owing to the fact that it is difficult to uniformly apply the matrix substance in a very thin layer. Therefore, the matrix substance is applied to the original sound band in several thin layers one upon another until the coating thus formed, when hardened, has the thickness of the matrix desired. When this thickness is reached, the band-shaped coating is drawn off the original sound band; it represents the matrix ready for use. The individual comparatively thin layer of the matrix substance applied at a time is dried before applying the next layer. For this purpose, slight heating is advisable in order to remove the solvent contained in the matrix substance.

HUGO WESTERKAMP.

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BY A. P. C.

H. WESTERKAMP
METHOD OF PRODUCING SOUND BAND MATRICES
Filed Oct. 5, 1940

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Fig. 2.

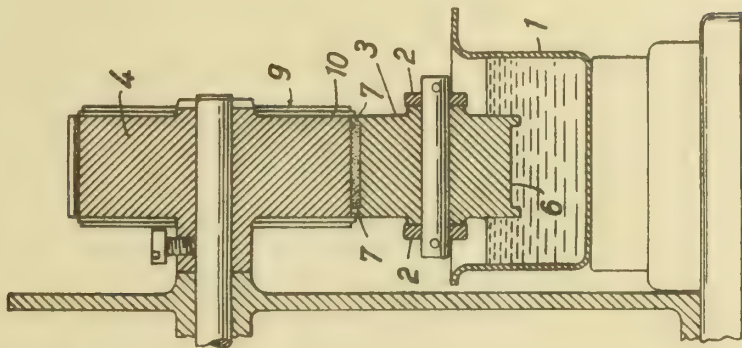
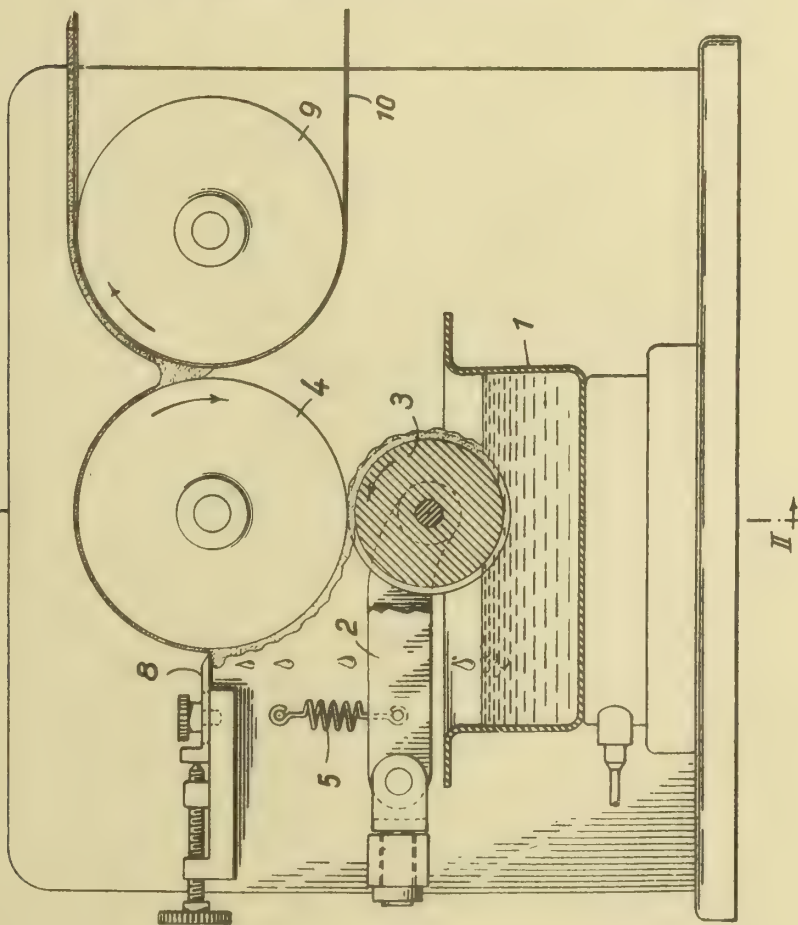


Fig. 1.



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ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF
TIGHTENING PLATES

Karl Ludwig Diehl, Opladen, Germany; vested in
the Alien Property Custodian

No Drawing. Application filed October 7, 1940

This invention relates to a process for the manufacturing of tightening plates which are applied especially in tightening devices being submitted to relatively high temperatures.

Tightening plates manufactured according to this invention may for instance be used on a large scale in the tightening devices of cylinder heads, exhaust pipes of combustion engines such as of high efficiency used in aeroplanes, and similar purposes. The new tightening plates are of a combination type, consisting of soft packing layers and supporting layers, for instance metal layers. The soft packing layers differ from already known tightening means in consisting of synthetic products showing a greater resistibility to heat than natural caoutchouc.

As such materials, polymerisates of organic compounds and mixtures with such polymerisates with resins, synthetic resins, softeners and vulcanizing materials; as well as with packing materials, come especially into question. Particularly good results can be obtained by the use of synthetic and caoutchouc-like polymerisates of unsaturated hydrocarbons, for instance: polymerisates of butadiene, dimethyl-butadiene, isoprene and the like. Into question, herewith, come highly-polymerised hydrocarbons of different grades of polymerisation, for example those, the molecular weight of which exceeds 100,000 or better 150,000. The increase of the molecular weight of such highly-polymerised hydrocarbons results in the increase of strength and elasticity with a simultaneous decrease of permanent elongation.

Further advantages of the above-mentioned synthetic products, as compared with natural caoutchouc, consist of a greater resistance to certain liquids and gases such as mineral oil, benzine, glycerine and the like. Furthermore, vinyl- or acryl-polymerisates and their mixtures with resins synthetic resins, softening and packing materials, can be advantageously made use of.

Other material such as resins, softeners, vulcanisation means, filling materials like soot, slag powder and the like may be added to the above mentioned soft base materials of the tightening plate, consisting of synthetic caoutchouc or highly polymerised hydrocarbons.

As an example for a composition of soft pack-

ing in accordance with the invention we name the following one:

| | Parts |
|----------------------------------------------------------------------------------------------------|-------|
| Perbunane (synthetic caoutchouc of the isoprene class)----- | 100 |
| Resin ----- | 10 |
| Softener ----- | 5 |
| Vulcanizing material----- | 20 |
| Inactive soot----- | 50 |
| Slag powder, slag wool, graphite, powder of chalk such as calcium silicate, and like fillers ----- | 230 |

The tightening plates may be manufactured in various manner, for instance by producing foils of soft packing material, consisting of synthetic caoutchouc or highly molecular hydrocarbons having a molecular weight of preferably not much less than 100,000, by means of mixing rolls, mashing or filtering devices.

For manufacturing these foils, the solid or pulpy form, the latex, a solution or an emulsion of artificial caoutchouc may be used.

These foils are now e. g. pressed on a layer of metallic packing of known composition, for instance a gauze of metal wire, upon a perforated flat piece of metal or the like and joined thereto by way of vulcanization.

When several metal layers are used, it is advantageous to place the filaments in the various gauzes so that they are not in parallel position but run in different directions so as to obtain the greatest possible tensile strength in all directions in the finished plate.

Two wire gauzes, for instance, the wires of each of which are arranged rectangularly in the base. are best placed one above the other in such a way that the wires run at an angle of 45 degrees to each other. The position of one wire in the lower gauze layer is at an angle of 45 degrees to the neighboring wire in the upper gauze.

Instead of wire gauze inlays also layers of long metal fibres may be used, the fibres of the different layers being so arranged that they do not run parallel to each other.

Stabilizing inlays consisting for instance of a perforated flat iron, a wire gauze or the like, are joined to the soft material part of the tightening device preferably by pressing or rolling the fluxible material, if necessary under application of heat, through or around the stabilizing inlays.

The tightening plate to be manufactured may for instance consist of a wire gauze as a stabilizing inlay, which is to be covered on top and below by layers of synthetic caoutchouc or similar artificial material. It has already been suggested to manufacture the plates desired by using two separate foils consisting of the same material which is to serve for covering the stabilizing inlay. One of these foils is then laid on top of the wire gauze, the other against the bottom of said gauze, the sides of the plates that face each other having been treated with sticking material before fastening them on to the gauze. Hereafter the whole of the tightening device is pressed together in a press or rolling device.

According to the above-mentioned variation one foil only of the covering material is rolled out which has about double the thickness of the two aforesaid foils. This foil of double thickness is laid above or below the wire gauze, whereupon both parts are united for instance by pressing.

The shapeable and fluxible material is thereby pressed through the meshes and around the single filaments of the gauze.

Thereby a completely uniform plate is obtained which has the advantage that it cannot be split into separate sheets again. The manufacturing process as described above is cheaper than the manufacturing of the tightening plate by joining several plates together. Furthermore it has the great advantage that a uniform plate manufactured in the way described is completely tight and may be used with far higher pressures than a tightening plate composed of several foils.

For the process of manufacturing a tightening plate which is to contain two stabilizing inlays one above the other, an especially thick foil shall be rolled out in a similar way, which is to have three times the strength of the layers situated above, below or between the inlays. This thick layer of fluxible material is then preferably sandwiched in between the two stabilizing layers. When pressing, the fluxible material of the foil flows through the perforations of the stabilizing inlay and around the solid parts of said inlays. As much as the manufacturing of two foils is thereby saved. It is also easier to manufacture a thick layer of a given size than a thin one. When manufacturing plates with two hard material inlays, for instance wire gauzes, one may proceed by putting the two gauzes one upon the other and to apply to the top and the bottom side of these two layers a soft material foil for instance of artificial caoutchouc, thus having the two wire gauzes sandwiched in together between two soft material foils. The whole packing is then pressed. The soft material flows through the openings of the inlays and around the filaments into the space between the two gauzes. Consequently a tightening plate is obtained which is completely homogenous as all enclosed air is removed by strong pressing.

For manufacturing tightening plates in the above-mentioned way such inlays, for instance flat irons, may preferably be used which have a rough or reamer-like surface or one which is provided with a number of projecting parts or points which stand out in relief from the surface. It is especially easy to press a fluxible material through the openings or interruptions and around the outstanding parts of such inlays.

Furthermore, when using vulcanizable or flux-

ible material the velocity of vulcanization is increased, for the projecting parts coming into contact with the pressing device cause a quicker distribution of heat through the whole mass of the material to be vulcanized. These tightening-devices show the advantage of greater heat conductivity also after finishing.

Experience has proved that conductivity of temperature of the new tightening means is very good, also when several layers of synthetic caoutchouc together with layers of gauze of metallic wire are used.

In consequence of the high elastic qualities of synthetic caoutchouc or highly polymerised hydrocarbons it is also possible to keep the tightening layers made of these materials, and covering the layers of metal gauze, relatively thin so as to improve the heat conductivity of the whole tightening plates considerably.

This is a remarkable advantage e. g. against already known tightening materials made of metal gauze and asbestos layers. It is not possible to keep the latter equally thin, partly because asbestos as a working material does not allow for the making of plates of the required thinness, partly because the asbestos layer must have a certain thickness to make up for the unevenness of the metal gauze, if a decrease of tightening is to be avoided.

No lessening of tightening pressure was found even after use for a longer period.

When one fastened at room temperature no re-adjustment of the fastening means is necessary even after the use at high temperature, less supervision is therefore required with the new tightening means as compared with types which are now in use.

While the contrary was to be expected, no hardening or destruction takes place when the tightening plates according to the invention are applied e.g. in cylinder heads and are thereby subjected to the extreme conditions of a combustion room, such as abnormally high temperature. Even when subjected for a longer period to such strain it never occurred that a plate was burnt or stuck to the cylinder walls.

It is therefore possible to remove the tightening plates without destroying them or injuring the surfaces, whereafter the plates may be used again.

No special treatment of the tightening plates such as applying graphite to their surfaces is necessary before mounting them in the motor.

Not only will the tightening plate or the like be much cleaner to handle but also the tightening effect will be increased, when the application of a graphite coating is omitted, because the soft and highly elastic surfaces of the packing will be more capable of filling and thereby closing the irregularities of the tightening surfaces, when free from such graphite coating.

This measure also decreases the possibility of the tightening material being squashed away along the tightening planes under the effect of high pressure.

These improved qualities of tightening plates manufactured according to my invention are even effective when the tightening surfaces were not prepared very properly.

This application is a division of application Serial No. 312,785.

KARL LUDWIG DIEHL.

ALIEN PROPERTY CUSTODIAN

TESTING AND TRAINING DEVICE FOR TWO-EARS SOUND LOCATORS

Max Maurer, Vienna, Germany; vested in the
Alien Property Custodian

Application filed October 11, 1940

With the device according to the invention two-ears sound locators can be tested with regard to the accuracy of direction-finding. Furthermore the device may be used as an apparatus for training the direction-finding crew in the use of sound locators for locating the invisible moving airplanes.

For testing two-ears sound locators up to now airplane noise imitating loudspeakers are used, mounted in great distance in order to ascertain subjectively by repeated direction-finding the mean sound direction to bring the same into accordance with the optical direction by suitable means, as for instance by altering the length of the path of the sound impulses conducted to the right and to the left ear, respectively. For this reason during the training in sound location the sound locator has been set in any direction and by repeated direction-finding the individual error in reading off the sound direction compared with the optical direction has been ascertained.

For testing the zero direction of the direction indicator of a two-ears sound locator according to the invention, in the plane of the parallel acoustic axes of the two sound receivers two sources of sound, as far as possible of equal loudness, timbre, and frequency, are arranged as far as possible in equal distances opposite the sound receivers in the mean position of the device so that on turning the sound locator differences in intensity and phase will occur between the impulses arriving at the left and right ear respectively, causing the impression of a displacement transverse to the sound direction of a single remote source of sound which can be located now by oscillating the sound locator into its acoustic axis.

In order to build a training device for sound location based upon the principle explained above, according to the invention the two sources of sound being situated exactly opposite the sound receivers in the middle position of the device and having as far as possible equal loudness, timbre, and frequency, are arranged on a support rotatably mounted on the pivot of the sound locator so that on turning this support differences in intensity as well as in phases between the impulses arriving at the right and left ear respectively, will occur whereby also by this turning the impression of a moving sound source will be created, the movement of which can be followed by corresponding turning of the sound locator in exactly the same manner as it is the case during the acoustic pursuit of a remote air-

plane moving in transverse direction to the sound direction.

The device according to the invention is shown in the drawings by way of example in two forms of execution in combination with a sound locator movable in a horizontal plane.

Fig. 1 shows in plan view a locator with two telephones and sound sources.

Fig. 2 shows in plan view a device in which the orifices of two equal sound conduits are used as sound sources, the conduits coming from a common sound source.

Fig. 2a shows the same device in an elevation from behind.

The two sound receivers 3, 3 are mounted on a horizontal support 2 journaled on a vertical pivot 1. To these two sound receivers the two horizontal sound conduits 4, 4 of equal length are connected in such a manner that the two shells 5, 5 made of soft rubber will bear tightly against the ears of the operator. Below the support 2 a T-shaped support 6 is journaled on the pivot 1 independently of the support 2, a loud telephone 7 (a small loudspeaker) being arranged on each of the two arms 6a, 6a, these telephones having as far as possible equal intensity and timbre. In the middle position of the support 6 the centres of the diaphragms of the two telephones are situated in the acoustic axis $y-z$ of the two sound receivers. The diaphragms of these two telephones connected together parallel or in series are set into oscillations by a common alternating current, preferably by the amplified current controlled by the gramophone sound box whereby preferably the gramophone disc produces airplane noise.

The support 6 is provided with an indicator 6b which coincides in the middle position with the zero mark of a dial 2a arranged on the pivot 2 in order to ascertain the accuracy of the adjustment of the sound direction with regard to the acoustic axis z_0-z_0 of the sound locator when the examiner turns the telephone support at will. Preferably the dial with the indicator is shielded so that it can not be observed by the operator. The results can be registered in a known manner by recording the angular differences between the sound direction and the locating direction on a running paper strip. In view of the fact that in practice often interfering noises caused by wind, motor cars etc. impede the direction-finding, preferably a supplement telephone generating such interfering noises is arranged on the support 2 or on the support 6.

Instead of the two telephones energized with

the same phase of a. c. also two sound conduits **8a, 8a** are arranged on the arms **6a, 6a** and situated in the middle position of the support **6** opposite to the two sound receivers, these sound conduits being connected with a vertical central conduit **8c** by a forked conduit **8b** and the central conduit **8c** being connected to the sound box of a grammophone **10** by a funnel **9**. Also in this

device the airplane noise produced by the sound box will issue from the opening **8, 8** of the sound conduit with equal phase, equal intensity, and equal timbre, and therefore will produce the impression of a single remote sound source the transverse movement of which is simulated by turning the support **6**.

MAX MAURER.

BY A. P. C.

Serial No.
360,844

Fig. 2

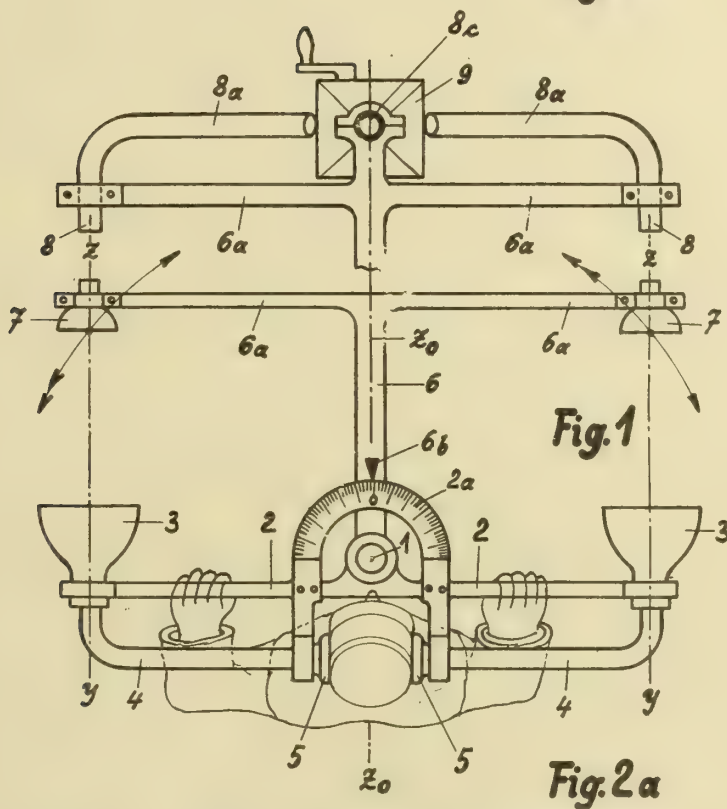
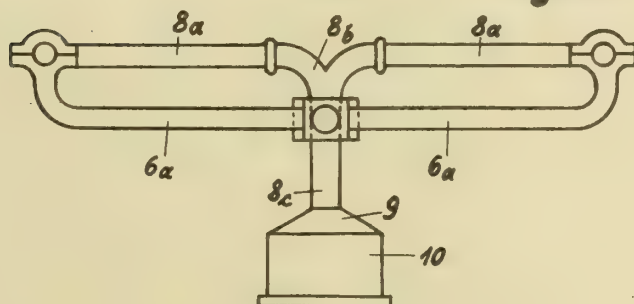
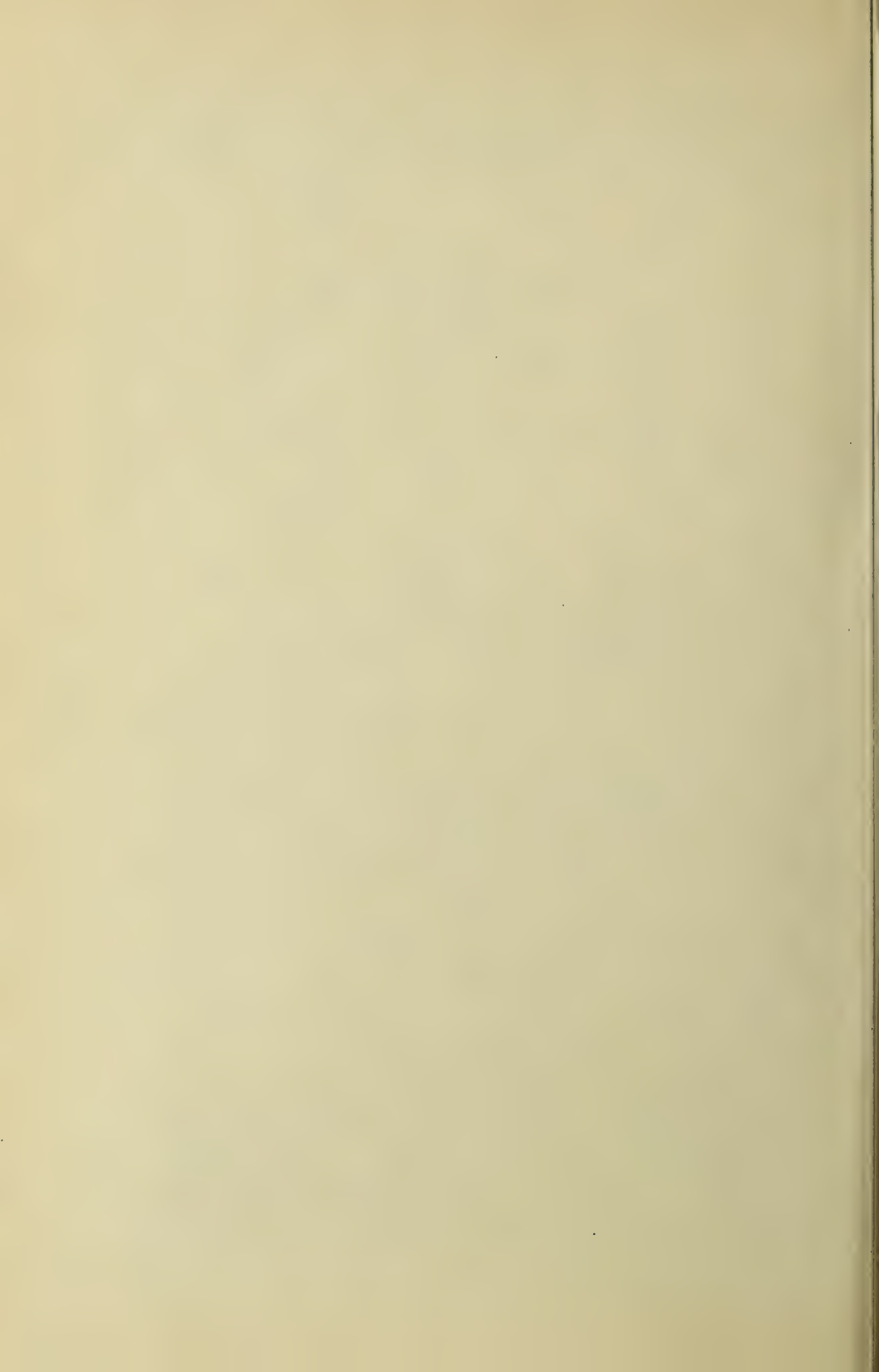


Fig. 2 a



Inventor:
Max Maurer.
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ALIEN PROPERTY CUSTODIAN

MANUFACTURE OF ARTIFICIAL FILAMENTS AND FIBERS FROM VISCOSE

Heinrich Fink, Rottweil am Neckar, and Gaston
Plepp, Wolfen (Kreis Bitterfeld), Germany;
vested in the Alien Property Custodian

No Drawing. Application filed October 11, 1940

This invention relates to the manufacture of artificial filaments and fibers of high tensile strength from viscose.

One of its objects is to provide a process for obtaining such threads.

Another object is to manufacture these threads by using novel spinning baths.

Still another object is the new threads obtainable by the new process.

These and other objects will be seen from the following specification.

Processes have recently become known which permit the production of artificial filaments or fibers of high tensile strength from viscose without employing strongly acid baths. Filaments, for example, having a tenacity above two grams per denier have been manufactured by spinning in a spinning bath which contains, if necessary, besides ammonium sulfate and sodium sulfate less than 7% sulfuric acid, whereby the filaments are drawn at least 25% and decomposed to cellulose hydrate. It has also been proposed to swell the filament in an intermediate bath after having left the spinning bath which contains less than 7% sulfuric acid, and then to take up or finish up the drawing operation. As intermediate baths there were used either water or solutions of alkaline reacting substances to which were added neutral substances, inorganic or organic compounds, alcohol, aldehydes, amines, even acids. During or after the swelling operation the filament is hereby drawn 25-100% or more of its original length and is finally decomposed to cellulose hydrate.

There are also described other processes in which a filament from viscose spun in an acid bath is strongly drawn in hot water. In order to increase the effect of the spinning baths and to augment the strength of the filaments, according to another process there were added bivalent salts, for example zinc sulfate, to the baths and the filaments spun in these baths were drawn in hot diluted acids.

Finally one had proposed to manufacture high tenacity artificial fibers and filaments by spinning the viscose into filaments in a spinning bath containing sulfuric acid and salts. After precipitation the filaments leave the precipitating bath and are swollen in an alkaline bath containing zinc or aluminium. The swollen filaments are then drawn in the swelling bath or after the swelling bath in the open air or in hot water or in hot steam.

Our invention is based on the observation that it is possible to obtain high tenacity fila-

ments in a simple way by using ordinary "miller-baths" of more than 7% sulfuric acid, which, however, contain neither zinc nor any other polyvalent metal, also without applying such swelling baths which contain polyvalent metal compounds. These filaments show high tenacities in the wet state their elongation being above 10%.

The new process consists in spinning viscose in a spinning bath containing sodium sulfate and sulfuric acid with a sulfuric acid content of, for example, 10-14%. The freshly spun filaments are then swollen in a hot alkaline swelling bath not containing any polyvalent metal compounds and the swollen filaments are strongly drawn either in the swelling bath or in separate hot salt solutions or in hot steam. The new invention compared with former processes has the advantage that no polyvalent metal compounds are necessary neither in the spinning bath nor in the swelling bath. Furthermore it has the advantage that spinning baths containing sodium sulfate and 10-14% sulfuric acid are not so easily disturbed during operation as baths with only 7% sulfuric acid. Compared with the known processes which contain no polyvalent metal salts in the spinning baths or which employ these swelling baths at ordinary temperature only, the new process yields filaments of better physical constants. The present invention is especially suitable for mass production in the textile industry, since there it is necessary to attain the best effects in a most simple and inexpensive way.

In the manufacturing process an intermediate bath may be placed between the acid spinning bath and the alkaline swelling bath which liberates the filament from the adhering acid and which prevents the alkali from being used up too quickly in the swelling bath. As intermediate bath there may be advantageously employed at temperatures of 40-60° C a water bath containing salts and preferably wetting agents being stable in an alkaline medium. The wetting agents being stable against alkalies are known from literature, for example from the "Textilhilfsmitteltabellen" by Dr. I. Hetzer, 2. edition, Berlin 1938. The swelling bath itself on the other hand is used at temperatures above 70° C, preferably at temperatures above 90° C. It consists of a 10-30% solution of sodium sulfate which contains 0.2-5% caustic soda. In such a swelling bath the freshly spun filament still containing cellulose xanthate groups may be drawn 50-100% of its original length.

During the manufacturing process according to the present invention preferably high grade cellulose having a high α -cellulose content is used. It has proved to be advantageous to employ a viscose which contains a certain amount, slight as it may be, of a most high polymeric cellulose. In this way a fiber is obtained which shows high tenacity and good elongation.

Example I

A viscose of 8% cellulose and 6.5% alkali is spun at a γ -value 45 into a spinning bath containing sulfuric acid from a nozzle of 600 openings each of 0.07 mm. diameter. The spinning bath contains 10% sulfuric acid and 30% sodium sulfate and is kept at a temperature of 45–50° C. The filament is wound up from the nozzle with a speed of 25 meter and is conducted through the spinning bath a distance of 15 cm. After leaving the precipitating bath the filament is conducted a space of 60–80 cm. through a 20% sodium sulfate solution heated up at 50° C and then a space of 80–100 cm. through a swelling bath which contains 1–2% caustic soda and 20% sodium sulfate and is kept at a temperature of 95–100° C. During the passage through the swelling bath the filament is drawn 100% of its original length and finally neutralized under tension in using sulfuric acid of a 5% concentration. The space in the neutralizing bath is again 80–100 cm. The filaments spun in this way have a dry tenacity of 3.3 grams per denier and a wet tenacity of 2.2 grams per denier at an elongation of 12–15%.

Example II

A high grade cellulose containing 96% α -cellulose is worked up into a viscose of 6% cellulose and 8.5% alkali which is spun at a γ -value of 45. The precipitating bath represents an aqueous solution of 12% sulfuric acid and 28% sodium sulfate and is kept at a temperature of 45–50° C. The space in the precipitating bath is 15 cm. long. The artificial filament extruded through a nozzle, 600 openings, 0.07 mm. diameter, is wound up at a speed of 25 meters and is drawn 100% of its original length in a swelling bath heated at 95° C either directly after leaving the precipitating bath or after passing an intermediate bath. The hot swelling bath con-

tains 2% caustic soda and 25% sodium sulfate. The intermediate bath which is put in after the precipitating bath and before the swelling bath consists of a 2% solution of sodium sulfate and is kept at 50° C. Sulfuric acid carried over by the filament into the intermediate bath is neutralized by caustic soda, so that the bath remains neutral all the time. The space of the filament in the washing- and swelling bath is around 80–100 cm. After leaving the swelling bath the filament is neutralized with diluted sulfuric acid. The filaments thus obtained possess a dry tenacity of 3.7 grams per denier and a wet tenacity of 2.6 grams per denier at an elongation of 12–15%.

Example III

Manufacturing process as in Example I with the difference that between the swelling bath and the precipitating bath at 50° C a 20% solution of sodium sulfate is used which contains 2% "Igepal." The filaments thus obtained show a dry tenacity of 3.6 grams per denier and a wet tenacity of 2.4 grams per denier at an elongation of 12–14%.

Example IV

6 parts of a highly-viscous linters-viscose being won from unripened alkali cellulose by sulfidizing with 50% carbon disulfide in a nitrogen atmosphere and being dissolved into a viscose of 5% cellulose and 6.5% alkali (γ -value 60; time of fall of a steel ball 700 sec.) are mixed after ripening for 24 hours at 10° C with 94 parts of an ordinary low viscous viscose from sulfite cellulose with 8% cellulose, 6.5% alkali (γ -value 45; time of fall of a steel ball 25 sec.). The viscosity of the viscose after mixing amounts to 44 sec. of the falling ball. The viscose is spun into a filament at 45° C from a bath consisting of 10% sulfuric acid and 30% sodium sulfate which after passing at 40° C a feebly alkaline sodium sulfate washing bath is drawn 100% at 95–100° C in a bath containing 10–20% sodium sulfate and 1–2% caustic soda and is then neutralized. The filaments show a titre of the single filament of 1.8–2 and a dry tenacity of 3.7–4 grams per denier, a wet tenacity of 2.4–2.6 grams per denier and an elongation of 16–20%.

HEINRICH FINK.
GASTON PLEPP.

ALIEN PROPERTY CUSTODIAN

DEVICE FOR CONTROLLING THE GAS PRESSURE IN AUTOMATIC BLANK CARTRIDGE FIRING IN AUTOMATIC GUNS

Hugo Schmeisser, Suhl, Germany; vested in the Alien Property Custodian

Application filed October 14, 1940

The invention relates to automatic guns and particularly to a device for controlling the gas pressure in automatic blank cartridge firing with such automatic guns.

It is an object of the present invention to provide a device or an arrangement of this kind which is simple in construction and able to offer resistance in use and which may be easily manipulated especially for cleaning purposes.

The invention consists therein that the gas throttling is effected by means of a loosely fitting core-bar or stem adapted to be inserted into the barrel of the gun and having a smaller diameter than the bore of the said barrel.

It is a further object of the invention to provide a loosely fitting core-bar or stem which extends substantially over the entire length of the barrel of the gun.

A further object of the invention is to provide a fitting core-bar or stem which is rigidly connected with a silencer-funnel in such a manner that both parts form a practical unit for use. The means for securing the said unity to the automatic gun as for instance a screw thread are arranged preferably on the said silencer-funnel.

In the preferred form of the present invention the fitting core-bar or stem and the silencer-funnel are rigidly connected by riveting a reduced end of the core-bar to the bottom portion of the silencer-funnel.

To these ends my invention consists in the novel construction and arrangement of parts to attain the ends above specified and in the details of construction and mechanism for other purposes, as will hereinafter more fully appear and which are defined in the claims at the end of this specification.

My invention in its preferred form of approximately such form is illustrated in the accompanying drawing, in which

Figure 1 is a central longitudinal section of a portion of an automatic gun constructed in accordance with the present invention, only so much of the barrel being shown as is necessary for the purpose of explanation.

In the drawing 1 designates the front part of the barrel of an automatic gun and 2 a loosely fitting core-bar or stem inserted into the bore of the barrel and having a little smaller diameter than the bore of the barrel. On the muzzle of the gun is fixed by means of screw thread 3b a silencer-funnel 3 provided with the gas channels 3a and secured to the front end of the fitting core-bar 2 so that both parts viz. the fitting core-bar 2 and the silencer-funnel 3 form a unity. In the example shown the front end 2a of the fitting core-bar or stem projecting from the muzzle of the gun is reduced or stepped and riveted to the bottom portion of the silencer-funnel as indicated at 2b. Instead of the use of a screw thread other suitable means may be used for connecting the silencer-funnel with the muzzle of the barrel as for instance a bayonet-catch or the like.

If in operation an automatic gun arranged for loaded or bulleted cartridge firing is to invert into an automatic gun arranged for blank cartridge firing i.e. with the usual and known cartridges without bullets of wood, it is only necessary to insert the fitting core-bar 2 provided with the silencer-funnel 3 into the barrel of the automatic gun and to screw up the silencer funnel 3 with its screw thread upon the screw thread on the front end of the barrel.

It is obvious that the device according to the present invention is simple in its construction and cheaply to manufacture and permits an easy and quick changing of an automatic gun from one kind of firing to another one.

A further advantage of the device according to the present invention consists in its high capacity of resistance and in the convenient possibility for cleaning.

It will be understood that I do not limit myself to the details of construction above set forth, but, on the contrary, that many modifications may be made within the broad scope of my invention.

HUGO SCHMEISSER.

THE HISTORY OF THE UNITED STATES

OF THE TERRITORY OF THE UNITED STATES

FROM THE FIRST SETTLEMENT TO THE PRESENT TIME

BY JAMES M. SMITH

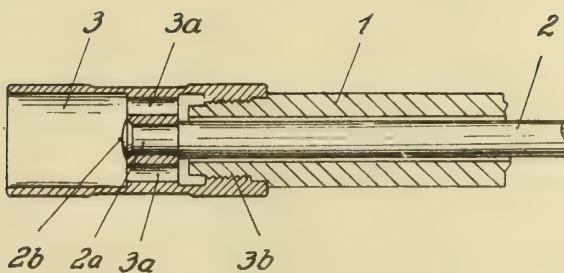
The history of the United States is a story of growth and expansion. From the first settlements on the Atlantic coast, the country has grown westward, covering a vast territory. The early years were marked by the struggles of the pioneers, who faced many hardships and dangers. They fought for their land, their freedom, and their way of life. The American Revolution was a turning point in the country's history, leading to the birth of a new nation. The United States then grew in power and influence, becoming a world leader. The Civil War was a great tragedy, but it led to the preservation of the Union and the end of slavery. The country continued to grow and develop, becoming a great power in the world. Today, the United States is a land of freedom, opportunity, and progress.

The history of the United States is a story of growth and expansion. From the first settlements on the Atlantic coast, the country has grown westward, covering a vast territory. The early years were marked by the struggles of the pioneers, who faced many hardships and dangers. They fought for their land, their freedom, and their way of life. The American Revolution was a turning point in the country's history, leading to the birth of a new nation. The United States then grew in power and influence, becoming a world leader. The Civil War was a great tragedy, but it led to the preservation of the Union and the end of slavery. The country continued to grow and develop, becoming a great power in the world. Today, the United States is a land of freedom, opportunity, and progress.

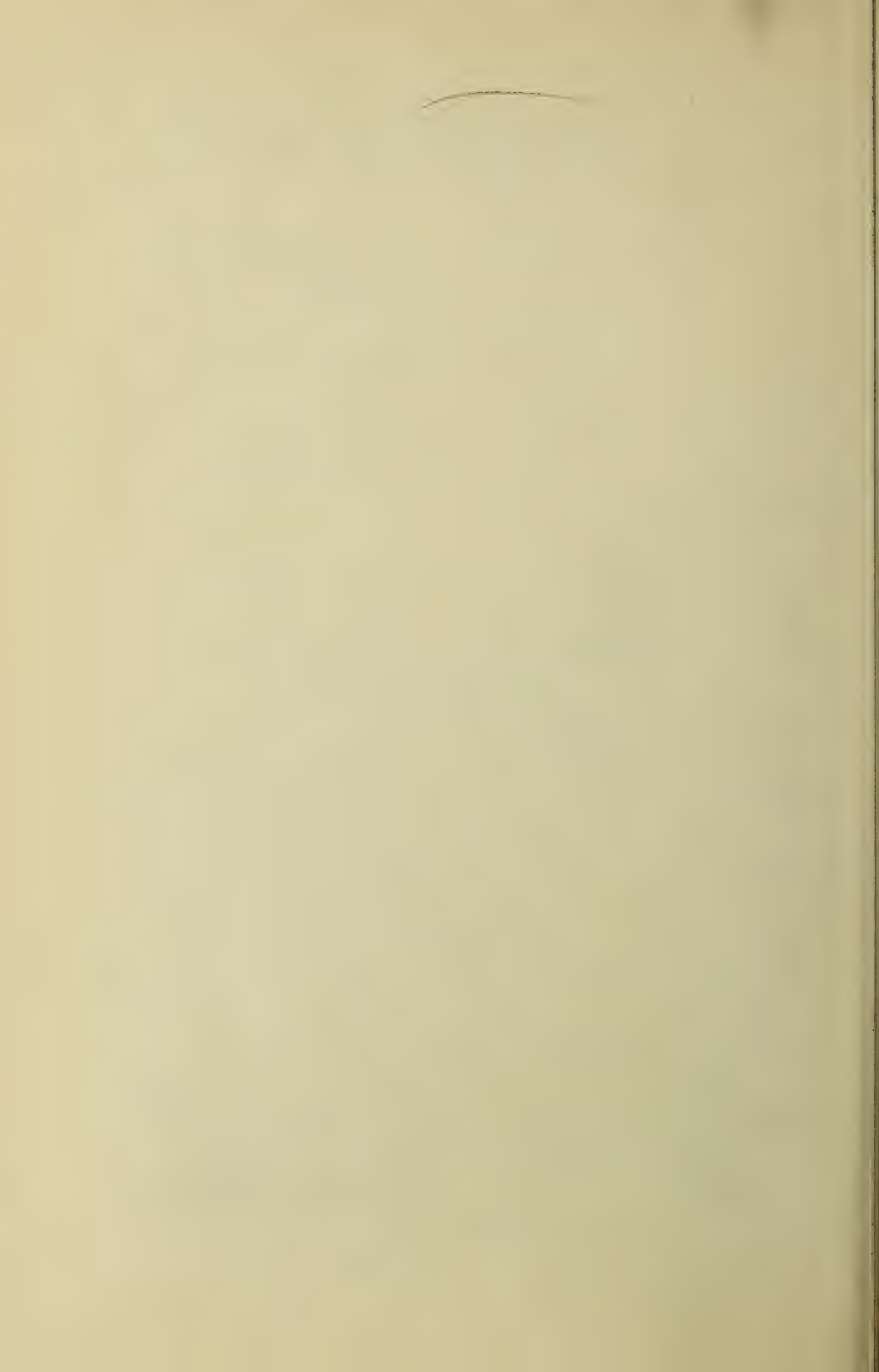
PUBLISHED
APRIL 27, 1943.
BY A. P. C.

H. SCHMEISSER
DEVICE FOR CONTROLLING THE GAS PRESSURE
IN AUTOMATIC BLANK CARTRIDGE FIRING IN
AUTOMATIC GUNS
Filed Oct. 14, 1940

Serial No.
361,184



Inventor:
Hugo Schmeisser
By
Young, Evers & Thompson
Attorneys



ALIEN PROPERTY CUSTODIAN

ALARM CLOCK MOVEMENTS

Helmut Junghans, Schramberg-Sulgen, Ecken-
hof, Germany; vested in the Alien Property
Custodian

Application filed October 14, 1940

This invention relates to an alarm clock movement, and has for its object to prevent return motion of the alarm setting spindle.

In the known alarm clock works in which the alarm locking or click spring is controlled by a member attached to the alarm setting wheel and having a recessed edge cooperating with a catch the alarm setting spindle must be rotated in one direction only so as to insure relative displacement of the attached member and the catch in the same direction. If the spindle is turned in opposite direction, the catch strikes the inclined edge of the recessed portion of the attached member and during further rotation the movement is driven backward by the change gears. Due to the gearing up effected in this case, the frictional resistances are usually so great that the alarm setting means break.

Various proposals have been made to prevent return motion of the alarm setting spindle in a positive manner, and one of them provides for instance a screw-on setting knob which will unscrew from the end of the setting spindle when an attempt is made to turn the latter in the wrong direction. This arrangement is, however, open to the objection that the knob is often lost and two kinds of knobs and fastening means are required for the alarm setting and the minute spindles.

It has further been suggested to interpose clutch couplings between the alarm setting spindle and the toothed wheel supporting the attached member mentioned, but the practical application of this suggestion was found to require too many additional structural elements.

According to the invention, the difficulties are eliminated by connecting the alarm setting spindle with a fixed point of the clock through the medium of a Schwarz coupling spring which is of the volute type and so wound upon a plain shaft as to hug it with a certain initial tension. One end of this spring has a tangential continuation which is engaged by the other coupling member, and the other end thereof is cut off closely to the shaft. Notwithstanding its small dimensions in the present instance, a coupling spring of this type is capable of transmitting relatively great forces and of offering so great a resistance to any attempt to turn the alarm setting spindle in the wrong direction that instantly and effectively attention is called to this faulty manipulation without injuring the clock.

The use of such a coupling spring for the alarm setting spindle affords the advantage that the alarm setting knob like the hand setting knob can be secured to its spindle by means of a square and that both knobs can be made alike and interchangeable. In clocks provided with the widely used shut off members which at the winding of the alarm driving spring are

disengaged from the alarm escapement wheel by a restoring spring, the Schwarz coupling spring on the alarm setting spindle may serve also for another purpose. Instead of cutting off one end thereof as mentioned, it is allowed to stand off from the spindle and to act thus as restoring spring for the alarm stop. The coupling spring is preferably initially tensioned when installed between the alarm stop and the fixed point of the clock.

One form of the invention is illustrated by way of example in the accompanying drawing, in which

Figure 1 is a front view of alarm setting and stopping parts required for understanding the invention; and

Fig. 2 is a top view thereof.

a is the alarm setting spindle, *b* the hand setting spindle, *c*₁ is the front plate and *c*₂ the rear plate, in which plates the two spindles and the other parts of the clockwork are arranged. *d* is the dial, and *c* designates the back wall of the casing. On the alarm setting spindle *a* a pinion *f* is disposed which engages the alarm setting wheel *g* having an attachment *g*₁. *h* is a toothed wheel which is rotated once every 12 hours through intermediate gears, not shown, and which is firmly connected with the hour-hand *i*. The wheel *h* cooperates in known manner with the alarm locking spring *k* and also with the attached member *g*₁ through the nose or catch *h*₁. From the alarm escapement wheel *l* the hammer rod *m* is driven in the usual way. *m*₁ is the stop arm cooperating with the locking spring *k*, and *m*₂ is the hammer.

The stop lever *n* is freely oscillatably disposed on the spindle *a* with the aid of two perforated flaps *n*₁ whose distance corresponds to the width of the frame. Through its arm *n*₂ it can engage the escapement wheel *l* in known manner, and its arm *n*₃ is engaged by the stop *o*.

A Schwarz coupling spring *p* is closely wound upon the alarm setting spindle *a* with initial tension. One end of the spring, designated *p*₁, engages a hole *c*₁₁ of the front plate *c*₁ so as to effect a coupling between the spindle *a* and a fixed point of the clock. The other end *p*₂ of the spring *p* lies on a continuation *n*₄ of the stop lever *n*. The spring *p* is arranged with initial tension between the plate *c*₁ and the stop lever *n* in such manner that the lever *n* is subjected to spring pressure which urges it into releasing position. Both setting spindles *a* and *b* are provided with squares *a*₁, *b*₁ of the same type to which setting knobs, *q*, *r*, also of equal construction, are attached. The coupling spring *p* is built in so that the spindle *a* can be turned only in the direction of the arrow *s*, Fig. 1.

HELMUT JUNGHANS.



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APRIL 27, 1943.
BY A. P. C.

H. JUNGHANS
ALARM CLOCK MOVEMENTS
Filed Oct. 14, 1940

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361,148

Fig. 1.

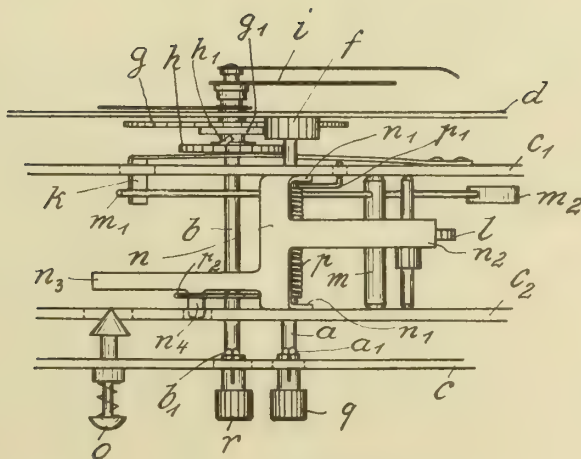
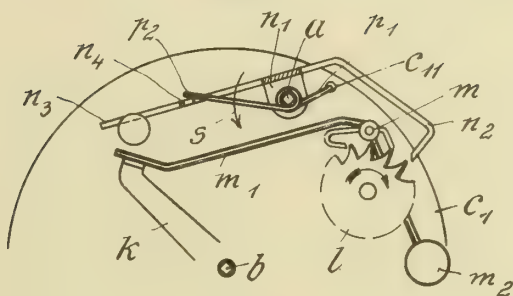
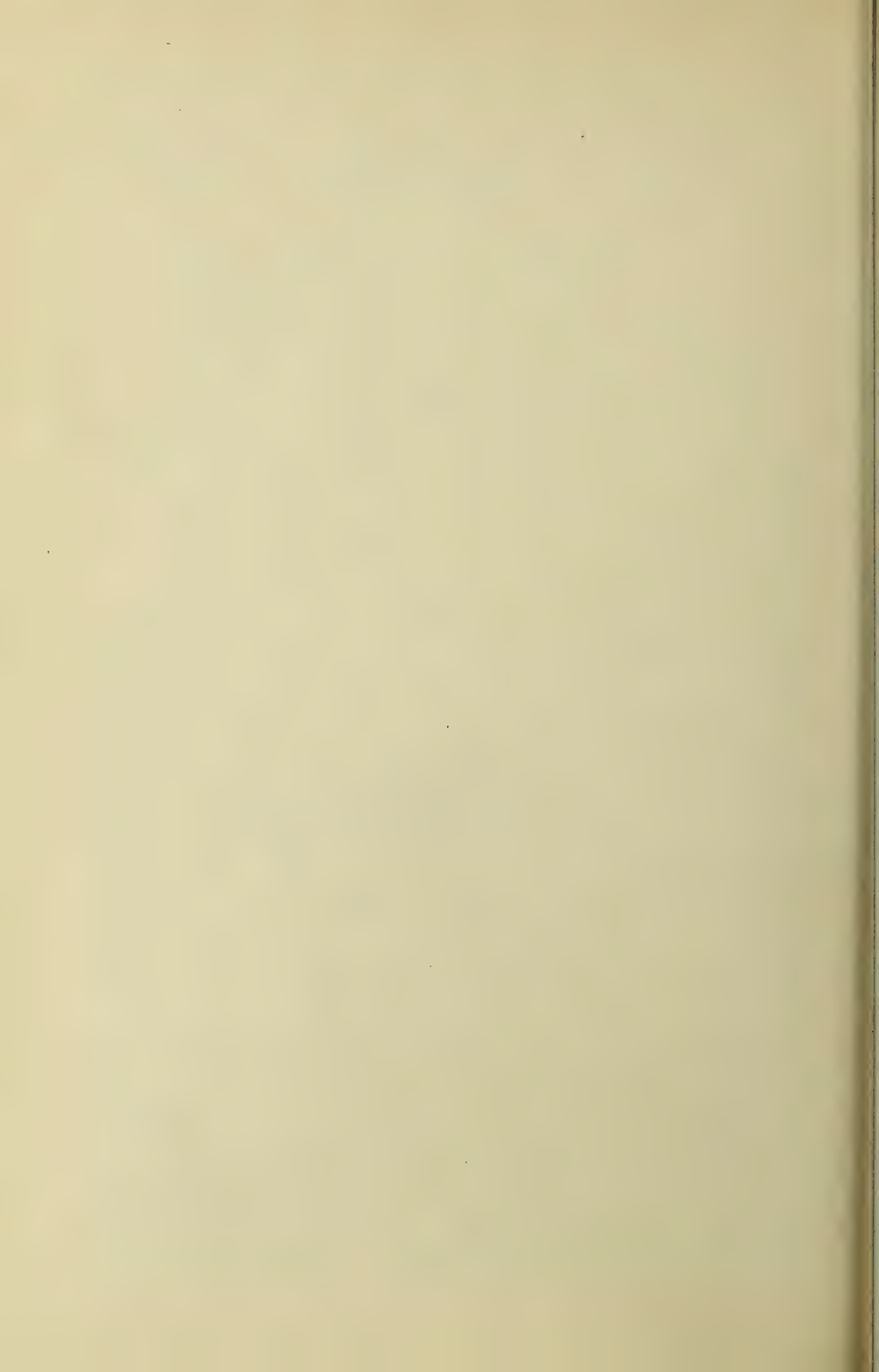


Fig. 2.

Inventor:
Helmut Jungmans
By *Young, Emery & Thompson*
Attorneys



ALIEN PROPERTY CUSTODIAN

GEAR MEMBERS

Helmut Junghans, Schramberg-Sulgen, Eckenhof, Germany; vested in the Alien Property Custodian

Application filed October 14, 1940

This invention relates to gear members, such as pinions, toothed rims or intermediate elements interposed between the working and supporting parts of watches, clocks and similar precision instruments, and has for its object to provide gear members of the kind specified which either consist of sound dampening material or in which the propagation of sound produced on hard parts is prevented through the provision of sound dampening intermediate elements. The invention includes further the particular use of such gear members in watch and clock making.

It follows from the objects stated that a substance must be provided which is suited to serve as material for working gear members, as gear tooth systems, as well as for making therefrom sound insulating intermediate layers, etc. The substance should further be capable of meeting the requirement of being easily worked, for instance cast or sprayed, without needing special treatments of a chemico-technical nature which, as a rule, lie outside the sphere of precision mechanics. Furthermore, the substance should not be affected by oil and benzine and not age.

These demands are complied with by a material sold under the registered name "Guttasyn" which becomes plastic to liquid at temperatures between 100° and 200° C and can be cast, sprayed or pressed. In cold condition this material shows similar elastic properties as rubber and gutta-percha. Elasticity, strength and hardness are determinable within wide limits. It is further unaffected by oil, benzine and most acids, and non-combustible.

The invention proposes therefore to manufacture precision gear members comprising members like toothed wheels cooperating with hard, for instance metallic, parts as well as intermediate elements between working parts, as toothed rims, and supporting parts, as bosses, of a gear member from rubberlike synthetic gutta-percha, for instance "Guttasyn", to dampen sound.

In the clock and watch making art it has been tried many times to suppress for example the noise caused by the rapidly moving spur gearing which drives the flywheel of the striking mechanism. It has been found now that complete suppression of this noise is possible by employing a gearing made from "Guttasyn" or a similar product.

The rubberlike synthetic gutta-percha can be used also, according to the invention, for sound-insulating intermediate elements by producing for instance in a hollow or lantern pinion the shrouds from "Guttasyn" and the trundles from

steel as usual. Hollow pinions of this type as well as the above-mentioned solid pinions of "Guttasyn" have given excellent satisfaction in suppressing or dampening the noise of the wheels in flywheel drives.

In case of vertical wheels, particularly escapement wheels for escape gears, sound insulation can be effected according to the invention by interposing between the rim and the body of the gear a "Guttasyn" layer uniting both parts and preferably engaging the flanks of both the body and the rim.

In the anchors for the escape gears in chronometers the pallets or pins may be embedded, according to the invention, in "Guttasyn" insertions which may be framed also in metal and guided in the anchor body so as to permit adjustment of the pallet.

The invention is illustrated by way of example in the accompanying drawing, in which

Figure 1 is a side view of the flywheel drive of a striking mechanism of a clock;

Fig. 2, a section of a pinion;

Figs. 3 and 4 are, respectively, an elevation and a section of a spindle provided with anchor or lever escape wheel and pinion;

Figs. 5 and 6 are, respectively, a front and top view of an anchor of a clockwork; and

Fig. 7 is a detail view.

In the flywheel drives of clockworks spur gears are used as a rule which frequently cause unpleasant noises. In the construction shown in Fig. 1 these noises are suppressed by producing the solid pinion *a* on the flywheel shaft *b* from "Guttasyn" by pressure casting. The teeth *a*₁ pass at their ends into solid discs *a*₂, Fig. 2, so as to provide a better hold against giving way. Cast "Guttasyn" shows a very smooth surface if worked in highly polished molds and is therefore well suited for pinions which have to transmit small forces. When "Guttasyn" pinions cooperate with hard toothed wheels, it is advisable to make the pinion teeth as strong as possible and the wheel teeth correspondingly weak, and to avoid also sharp edges, burr, etc.

In movements of clocks and watches it is particularly the ticking noise of the escape gear, as the lever escapement, cooperating with the regulator that has to be suppressed. Figs. 3 and 4 show how the sound insulation with respect to an escapement wheel and pinion is effected by employing sound dampening intermediate layers. The lever escapement wheel *c* is made of two parts, viz. the toothed rim *c*₁ and the body member *c*₂ which is firmly disposed on the staff or

shaft *d*. Both parts *c*₁ and *c*₂ are held together by a "Guttasyn" layer *e* which engages at *e*₁ the flanks of the parts *c*₁, *c*₂ like a flange and thereby prevents axial displacement thereof. As "Guttasyn" and metal have been cast together and form a good bond, any relative rotation of the body and rim of the wheel *c* is normally out of the question. To provide for absolute safety in this respect both parts could be fitted with interengaging inward and outward bulges.

The pinion *f* of the escape wheel *c* is hollow, and the trundles *g* are inserted in "Guttasyn" discs *f*₁, *f*₂. The trundles can be protected against axial displacement by making them somewhat shorter if discs *f*₁ with through-going holes are used and closing the holes by passing over them a hot steel, or, as shown in the drawing, the disc *f*₂ may have blind holes and the other disc *f*₁ through-going holes before which a closing disc *h*, possibly of metal, is arranged.

The sound insulation according to Figs. 3 and 4 has been found to be effective and may be applied also, for example, to the wheel *i* driving the flywheel pinion *a*.

For the purpose of dampening sound it is advisable to embed also the anchor members, *l*₁, *l*₂

in clockwork anchors *k* in "Guttasyn" insertions *m*, as shown in Figs. 5 to 7. These insertions are placed in pockets *k*₁, *k*₂ formed by repeatedly offsetting the anchor body. To avoid displacement of the members *l*₁, *l*₂ holes *l*₁₁ are provided therein, as indicated in Fig. 7, through which "Guttasyn" can pass. It is further possible to provide the "Guttasyn" insertion with a metal frame in such manner that the frame, the sound insulating insertion and the pallet member form a unit which is guided in the anchor body and adjustable relative to the escape wheel.

The invention is not restricted to the use of the substance sold by the name of "Guttasyn" but covers all substances having similar chemical and technical properties, i. e., substances that are elastic like rubber, pourable and unaffected by oil and aging.

Guttasyn is a thermoplastic substance on the basis of vinylpolymeric, e. g. of polyvinylacetate or of the polyvinylester of the acrylic acid, or of the polyvinylester of the methacrylic acid or of chlorid of polyvinyl or mixtures of same, with addition of plastifiers and fillers.

HELMUT JUNGHANS.

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APRIL 27, 1943.
BY A. P. C.

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GEAR MEMBERS
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2 Sheets-Sheet 1

Fig. 1.

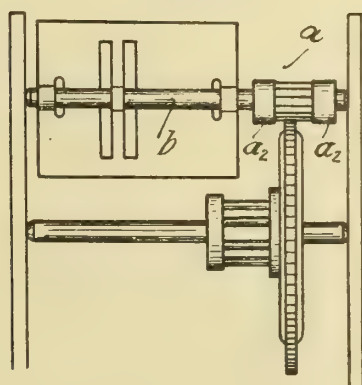


Fig. 2.

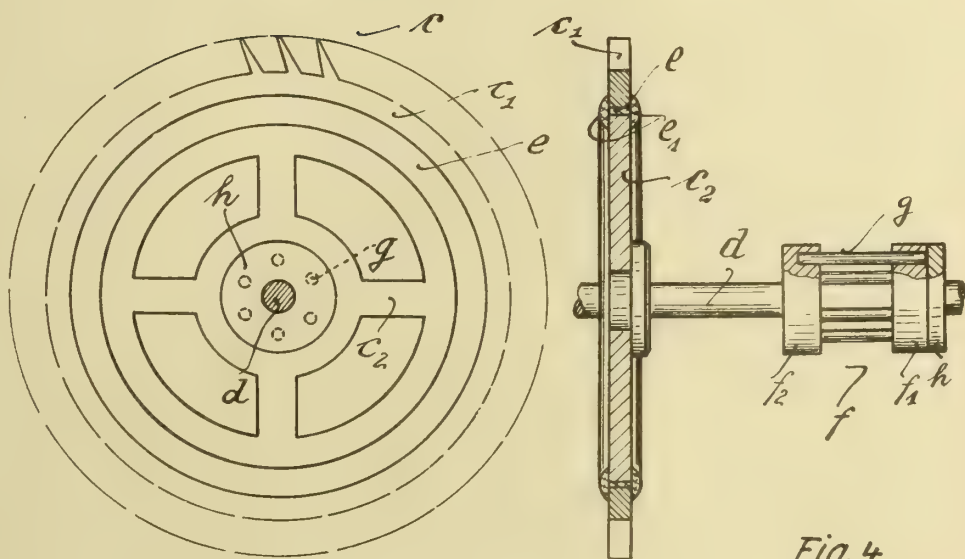
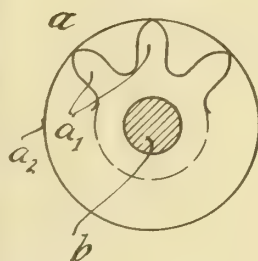
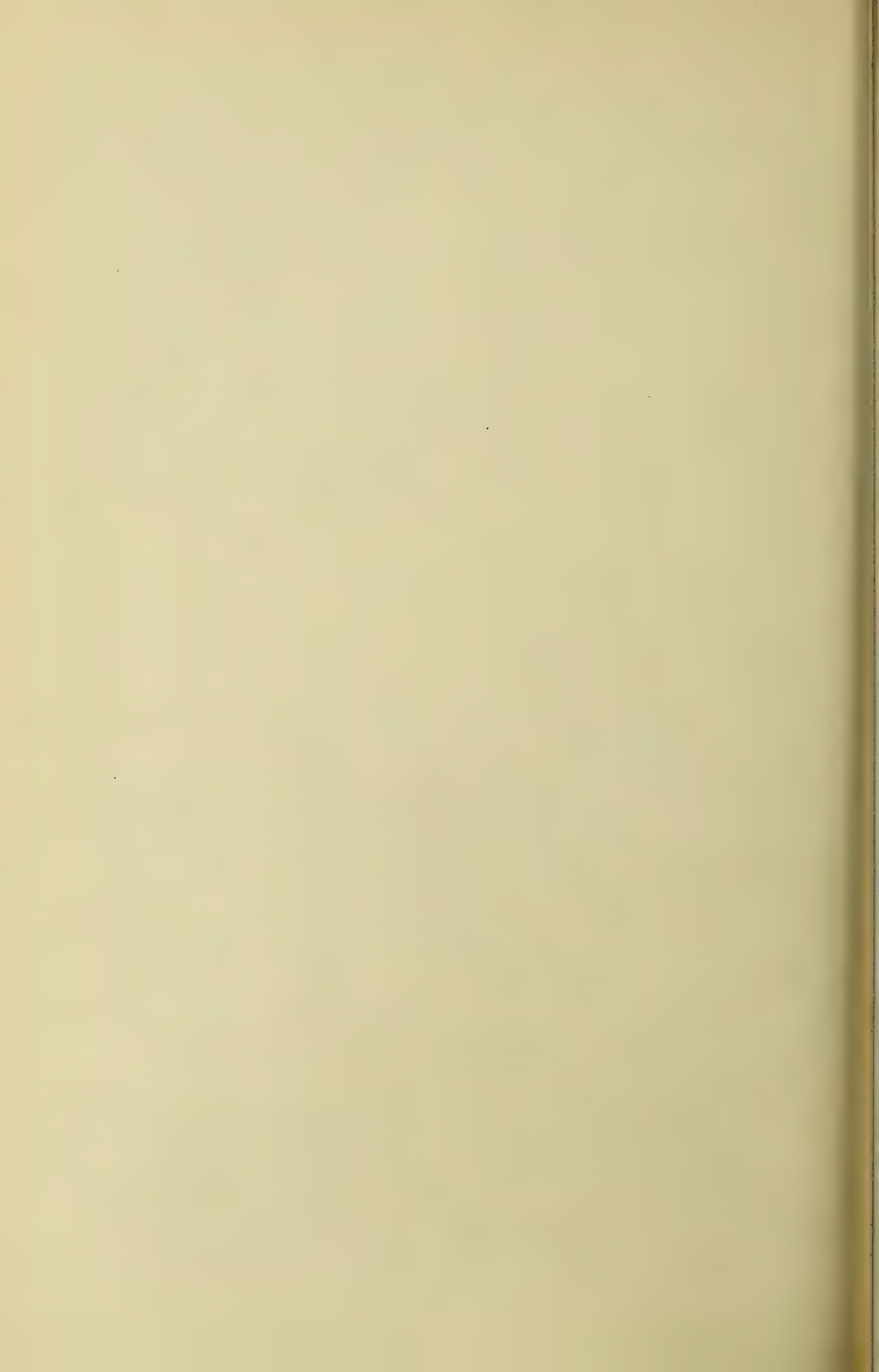


Fig. 3.

Fig. 4.

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2 Sheets-Sheet 2

Fig. 5.

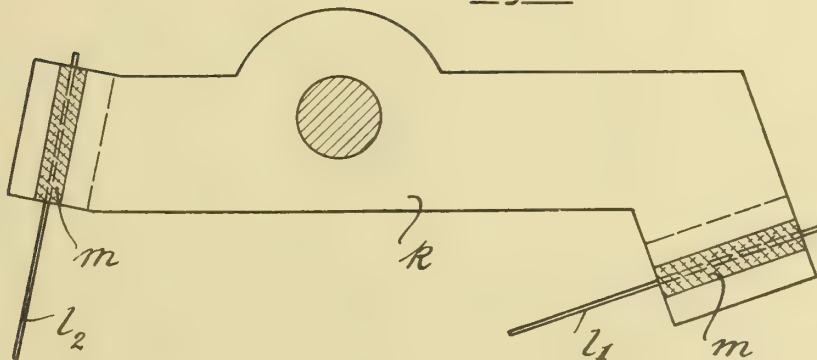


Fig. 6.

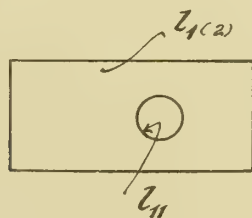
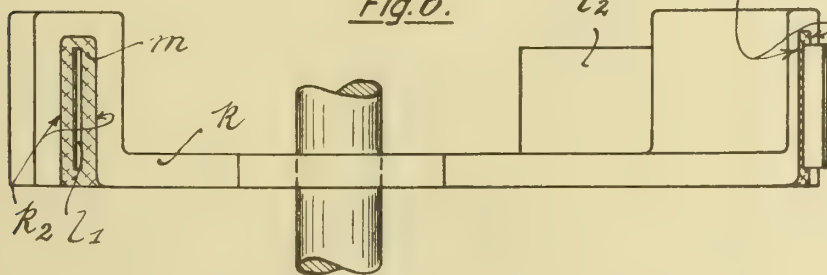


Fig. 7.

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ALIEN PROPERTY CUSTODIAN

INCREASING THE ELASTICITY OF TEXTILE FIBRES

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No Drawing. Application filed October 17, 1940

The present invention relates to a method of increasing the elasticity of textile fibres.

As is well known, the usability of a fibre is dependent not only on its resistance to tearing, but to a high degree also on its elasticity properties. Consequently efforts are made to produce fibres having besides a high tensile strength also a sufficient elasticity.

Hitherto the ways chosen to obtain the object aimed at exclusively were in the line of the spinning technics. So for instance it has been tried to obtain fibres with the desired properties by suitable combinations of the spinning conditions, whereby, however, it was found that the spinning measures, allowing to obtain a larger elasticity, in most cases also cause a reduction of the tensile strength.

Now, according to the present invention the elasticity properties of artificial fibres may, without depriving the fibres of their resistance to tearing, be increased by passing the fibres in a wet state, preferably in the form of a ribbon, between strongly squeezing rolls of soft rubber.

It is well known that two strongly squeezing rubber rolls do not contact along a line, but along a squeezing surface which is the larger, the larger the pressure is with which the two rolls are forced against each other. The circumferential speed of these rotating rubber rolls is not uniform at

all points of the circumference, but is first reduced along the squeezing surface and is then again raised to its original value. The reduction occurs at the beginning of the squeezing surface, i.e. from the beginning of the contact of the two rolls and extends as far as to the middle, i.e. the point of highest pressure. The increase occurs from this point and extends to the end of the squeezing surface, i.e. to the end of contact.

In accordance with the above explanations, the fibre bundle on its way from the beginning as far as to the middle of the squeezing surface is first compressed and is then lengthened from this point to the end of the squeezing surface. Both processes, compressing and lengthening, act in the longitudinal axis of the fibres and thereby increase the elasticity of the fibres. So for instance freshly spun viscose threads in the form of a ribbon were rendered substantially more elastic by this treatment without considerably reducing the tensile strength. By once passing the fibre bundle through a pair of squeezing rolls the elasticity of the fibres was increased in the dry state from 8 to 12% and in the wet state from 11 to 16%. The effect may still be increased by repeatedly passing the ribbon of fibres through the squeezing rolls.

WALTER VOIGT.



ALIEN PROPERTY CUSTODIAN

METHOD AND APPARATUS FOR PRODUCING FINE HOLLOW THREADS

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Application filed October 22, 1940

Hollow filaments from solutions of acyl cellulose may be partially obtained according to the usual dry-spinning process if thereby the temperature of the drying gas is considerably raised above the boiling point of the solvent and if the speed of spinning is reduced. According to this method, it is not possible to obtain only hollow threads in a technically satisfying manner; on the other hand the speed of spinning must thereby be reduced in such a way that the production of hollow threads becomes uneconomical.

Now it has been found that it is necessary to apply quite determined temperatures and streaming conditions of the drying gas in order to obtain fine hollow threads with security by the usual speeds of spinning of 150 m and more pro minute. According to this invention the thread passes two steps of treatment. In the first step the thread is rapidly and partially freed from the solvent by a strong current of warm gas, the temperature of which does not considerably lie above the boiling point of the solvent. In this time the surface is solidified while the interior of the thread is still fluid and contains solvents. The drying gas thereby may stream in the direction of the thread or against it. Then the thread passes a second zone where the gas has a temperature lying considerably above the boiling point of the solvent. In this zone the thread forms hollow spaces by evaporating of the solvent in the interior of the thread, whereby the thread becomes tubelike. The raising of the temperature in the second zone may be executed in such a way that the walls of the room through which the threads pass are heated or by introducing hot gas into the room and so on. Two possibilities are given for the treatment of the thread in the second zone. This zone may be fed by only a part of the drying gas which was applied in the first zone for instance by streaming off of a part of the drying gas from the first zone. But it is also possible to introduce the drying gas into the treating room in such a way the gas streams against the direction of the thread. In this case no drying gas from the first zone comes in the second zone. The room of treatment is suitably a narrow canal whereby the thread passes near the wall. The second possibility for the treatment of the thread in the second zone consists in diminishing the velocity of the drying gas in contrast to the velocity in the first zone. This is possible, if the second zone has a considerably higher diameter than the first zone. By this way a higher velocity of the drying gas in the first zone is attained.

By this method in combination with the heating up of the second zone the threads only solidified on the surface by evaporating of the solvent in the first zone, blow up whereby hollow spaces respectively hollow filaments are formed. According to the invention fine hollow threads with 3-4 and fewer denier are formed by means of the usual speeds of spinning of 150 m pro minute and more. The hollow threads have a diameter which is about 3-4 times larger than that of complete threads of the same titre.

The apparatus used differs somewhat from the usual ones. Above all, they have a heatable canal being generally as long as the spinning cell and arranged in some distance from the spinnerette. The canal is heated by steam or electrical manner. It is also possible to blow hot gas into the canal in order to introduce additional heat into the interior of the canal. If, in the simplest case, the heated canal is arranged in some distance from the spinnerette, a part of the drying gas can stream off between the canal and the inner walls of the spinning cell and this part meets at the end of the canal again the drying gas which streams through the canal. The amount of the drying gas branched off is regulated by suitable devices like flaps or valves and the like. The Figs. I to III show in section an apparatus according to the invention. Essentially the apparatus consists of the spinnerette 1, and the pipes 2, 3 and 4 through which the drying gas enters respectively leaves. 6 is a narrow heatable canal through which the threads pass as near the walls as possible. Flaps or valves 7 are further arranged for regulating the movement of the gas in the interior of the spinning cell.

Fig. I shows in the interior of the spinning cell 5 a heatable canal 6 arranged in some distance below the spinnerette 1. Between the spinning cell 5 and the canal 6 some flaps or valves 7 are fitted. The apparatus works as follows: A spinning solution nearly gelatinized enters the interior of the spinning cell 5 through the spinnerette 1. Through the pipes 2 hot gas is blown into the spinning cell. In some distance from the nozzle the threads are then solidified on the surface whilst the interior of them is nearly fluid. A part of the drying gas enters the room between the spinning cell 5 and the canal 6 according to the position of the flaps 7 and meets at the end of the canal again that part of drying gas streaming through the canal. Thereby it is attained that the speed of streaming in the canal 6 be-

comes not too high for the formation of hollow threads, what would arrive if all the gas entering the spinning cell at 2 would pass the canal 6. When the threads are solidified on the surface, they pass the heated canal 6 whereby the solvents in the interior of the threads evaporate and tubelike hollow threads are formed.

Fig. II shows the spinning cell 5 and a heated canal 6 which enters the spinning cell at the bottom of the cell. At the lower parts of the spinning cell 5, pipes 3 are arranged through which the drying gas enters or leaves. By this arrangement the drying gas may enter the first zone from above through the pipes 2 or from below through the pipes 3 whereby the drying gas moves either in the direction of the forming thread or opposite to it. In this first zone the threads form a skin on the surface. The drying gas forming hollow spaces in the interior of the thread enters the heated canal 6 either from the spinning cell or through the pipes 4. The amount of this part of drying gas is considerably lower than the amount in the cell 5 solidifying the threads only on the surface.

The arrangement in accordance with Fig. III differs from that of Fig. II in such a way that pipes 8 for hot gas enter the upper part of the heated canal 6. By this way the heating of the interior of the canal is favoured and, if necessary, the evaporating of the solvent may be accelerated. The arrangement of hot gas-pipes according to Fig. III may also be applied in arrangements according to Figs. I and II.

In order to give the drying gas a lower speed in the second zone of the spinning cell than in

the first one the lower part of the spinning cell is wider. Fig. IV shows schematically this kind of arrangement.

1 is a spinning cell the lower end 2 of which is widened and provided with a heating jacket. Instead of a heating jacket, a heating coil or other means may be applied for heating up the cell. 3 is the spinnerette and 4 and 5 are the pipes for entering or leaving drying gas. The spinning cell is suitably contracted between the upper and the lower part of the cell marked by an interrupted line in Fig. IV.

The apparatus is operating as follows: The spinning solution nearly gelatinized enters the upper part 1 of the spinning cell through the spinnerette 3. The drying gas entering the cell through the pipes 4 solidifies the thread on the surface and forms a skinlike coating. Then, the threads pass the lower part 2 of the spinning cell where the speed of the streaming gas is considerably lower because this part is wider. In this part of the apparatus heated up to a higher temperature by means of a heating jacket, the threads are blown up under formation of hollow spaces whereby hollow threads are formed. Highly heated gas may be blown into the spinning cell near the widening in order to increase the effect of heat in the lower parts 2 of the spinning cell.

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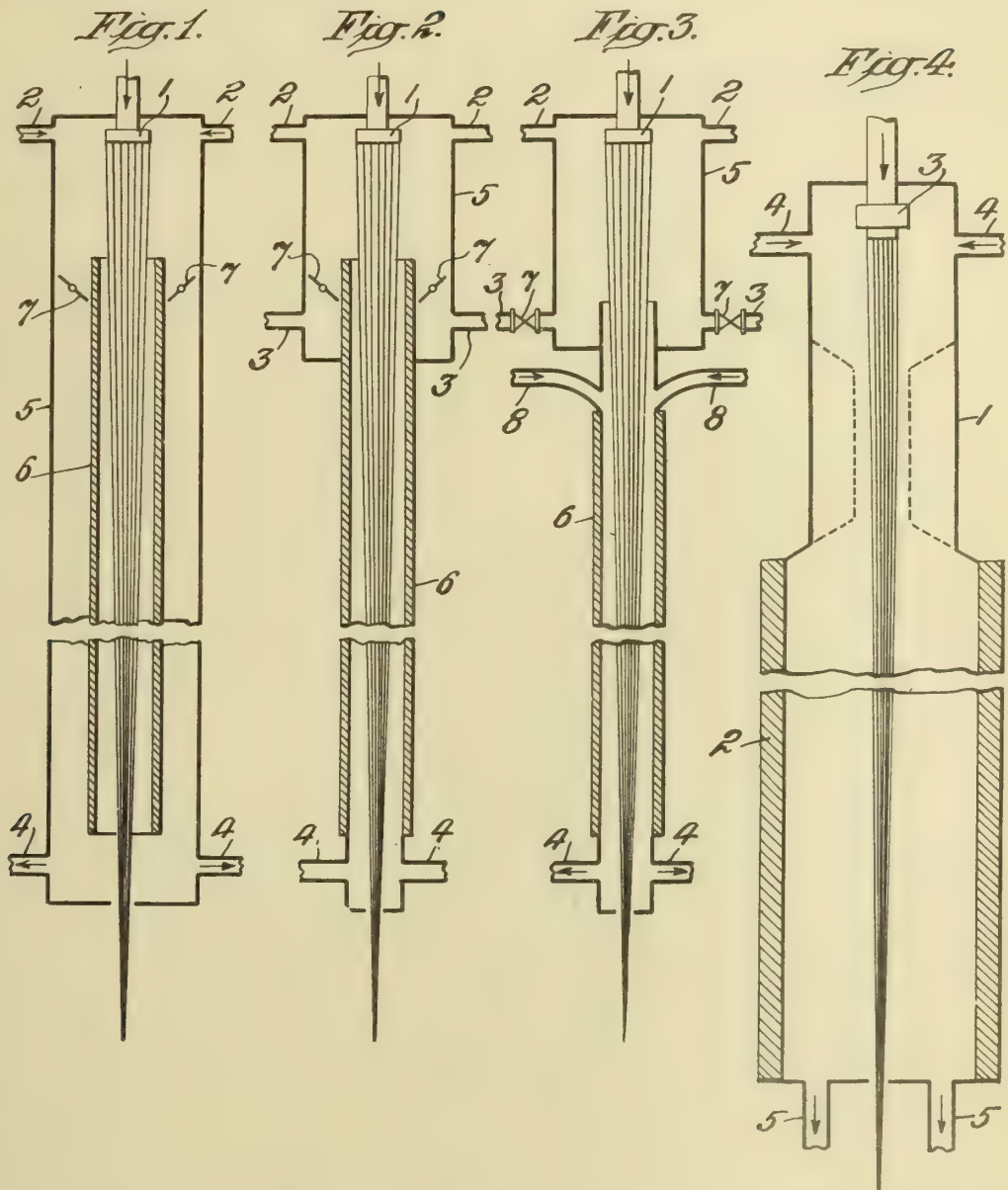
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BY A. P. C.

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METHOD AND APPARATUS FOR PRODUCING
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ALIEN PROPERTY CUSTODIAN

KEY HEAD

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Application filed October 22, 1940

The invention relates to key heads for calculating machines, in which key bodies and characters consist of differently colored plastic or sprayable synthetic materials.

For these machines, ordinarily, keys are used that in comparison with their small diameter have a great height and instead of an otherwise ordinary key shank have an aperture in which the suitable machine part is fastened. This form of construction, especially the characteristic key head form, in comparison with the usual flat typewriter machine key heads, makes special methods of preparation necessary in order to be able to make them economically.

It is, moreover, difficult and time-consuming if the key shank hole and a passage continuing from this to the key head surface are used for spraying in the differently colored character composition, since the residue of the character material remains in the key shaft hole and must be removed therefrom with considerable difficulty. In like manner, the passages for the supplying of the character-forming material could be distributed only on the circumference of the key shank hole, which involves certain drawbacks. Even the arrangement already known in typewriter machine heads with passages which pass through the body of the head, outside the key shank hole, up to the bottom of the head cannot be used directly in the present type of head since in it comparatively long injection passages or dies corresponding to the same are required in the casting mold, which would have only slight durability because of the limited cross-section that is possible due to space requirements.

These difficulties are eliminated by the present invention in that the injection passages and the key shank hole are combined into a single continuous passage, for instance, cross-shape or T-shape in cross-section. In this way, the die for forming these holes is provided with a simple continuous reinforcement.

In the drawing, an illustrative example of the invention is shown in a number of views in which:

Fig. 1 shows a key head embodying the invention viewed from above;

Figs. 2 and 3 are lateral sections of the same on lines 2—2 and 3—3, respectively, of Fig. 1; and

Fig. 4 is a perspective view in partial section of a die for molding the passages.

The key head shown by way of example in Fig. 1 is one of the manipulating keys of a calculat-

ing machine that have a different shape from the other number keys. The use of the invention, however, is not limited to this shape of head, it being applicable just as well to the number keys or other shaped parts to be provided with characters.

The quadrangular key head body 1 exhibits an inclined surface 1a above, while below it passes into an abruptly constricted sleeve 1b. In the surface 1a, the character 2 to be made of a material of another color is embedded (Fig. 1), so that the surface of the character and that of the key body are located in one plane. A character channel 3 cut out of the key head surface for the purpose (Figs. 2 and 3) has walls substantially perpendicular to the surface of the head surface and a flat channel bottom of the usual depth. Outlet openings 4a, 4b of an injection passage 4 that is led up from the bottom of the head body intercept the channel at a number of places. In the same direction as the injection passage 4 and standing at right angles to the same in the lengthwise direction is the usual opening 5 for the reception of a key shank or key lever at the bottom of the head, which is closed at the top by an inclined end wall at a suitable distance from the key-head surface. The injection passage 4, on the contrary, passes directly into the character channel 3, forming the above-mentioned discharge openings 4a, 4b, which are given dimensions such that in all cases a part of the body of the key-head more or less enclosed by the line trace of the character remains in connection with the rest of the key-head body.

The die for forming the passages presents a cruciform cross-section with the laterally projecting parts 6, 7 as seen in Fig. 4. Of these parts, the part 6 intended to form the key shank hole is provided with sharply angular outer edges, while the die part 7 for forming the injection passage has rounded off edges and is constricted in cross-section at the places of attachment to the rest of the die form, so as to prevent any possible escape of the contents of the passage toward the inside of the head. The top surface of the stamp is cut back to conform to the above-described shape and length of the injection passage 4 and the shank opening 5.

The manufacture of this type of head is accomplished just as with typewriter machine key heads by simultaneous molding of the outer shape and the inner passages of the key head body, the die reinforced by its constructional form permitting rapid penetration in the still plastic head material. Because of its ribbed

form, there is no danger that the die will bend or break off during ordinary molding or pressing operations. The character material subsequently is sprayed, in the most simple way, into the finished key head from the bottom openings of the injection passage 4, by positioning injection nozzles in the openings. It should be noted that a core part must be present in the key shank hole

5 during the spraying in order to prevent penetration of the sprayed material. This core for the key shank hole is preferably combined in one piece with the injection nozzle, it being possible to place the nozzle in position by means of the guide thus provided, directly and in the shortest possible time, through the openings of the injection passages.

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APRIL 27, 1943.
BY A. P. C.

H. MARTIN ET AL
KEY HEAD
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Serial No.
362,296

Fig. 1.

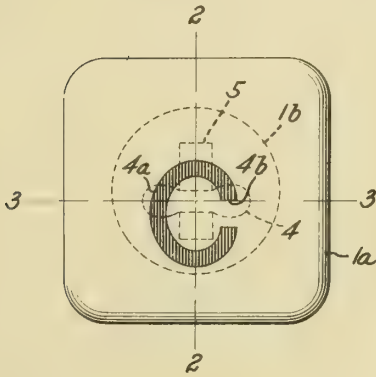


Fig. 3.

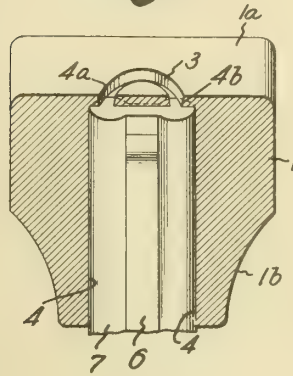


Fig. 2.

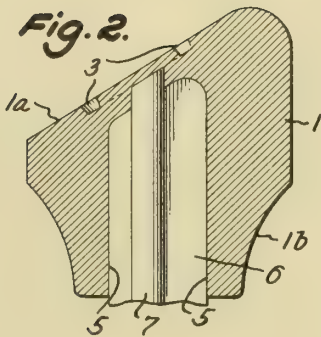
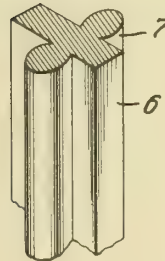


Fig. 4.



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ALIEN PROPERTY CUSTODIAN

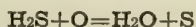
RECOVERY OF SULPHUR FROM HYDROGEN SULFIDE OR HYDROGEN SULFIDE CONTAINING GASES

Heinrich Koppers, Essen, Germany; vested in the
Alien Property Custodian

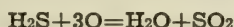
Application filed October 23, 1940

The invention relates to the recovery of elementary sulphur from hydrogen sulphide or hydrogen sulphide containing gases by acting upon the gases with oxygen (air) preferably in the presence of catalysts as bauxite and more particularly to the recovery of sulphur from such gases which contain beside hydrogen sulphide cyanogen compounds or other reactive nitrogen compounds or both of them.

It is a known method to recover elementary sulphur from hydrogen sulphide in that the hydrogen sulphide is mixed with a definite quantity of oxygen (air) and is converted according to the following reaction equation:



Beside this reaction certain side reactions take however place between the hydrogen sulphide and oxygen, for instance according to the equation:



It has been found that the recovery of sulphur from gases containing hydrogen sulphide is rendered difficult or even impossible due to these side reactions if the gases contain also compounds of cyanogen or other nitrogen compounds as amines, ammonia and the like. The sulphur cannot be separated from these gases in such a way that it collects in form of a regulus. The sulphur precipitates rather in more or less large drops which are very viscous and do not join at all or only very slowly. It also happens that this viscous sulphur deposits on the bodies serving as catalysts as for instance on the bauxite pieces and sticks to them so that the surface of the catalyst is covered with a dense coat of sulphur and becomes ineffective.

The inventor now found out that said difficulties in the treatment of gases which contain beside hydrogen sulphide other compounds of cyanogen or other nitrogen compounds arise because the ammonia which is either contained in the gases to be treated or is formed by the partial decomposition of cyanogen compounds, amines or the like, converts with sulphur dioxide resulting from said side reaction and with water into salts of ammonia of the sulphurous acid. These salts of ammonia are solid at the temperatures in question and mix in form of more or less fine crystals with the fluid sulphur so that its viscosity is badly influenced.

Now, the object of my invention is to improve the recovery of sulphur from gases which contain beside hydrogen sulphide cyanogen compounds or other nitrogen compounds in such a

manner that the recovered sulphur collects as a regulus and may be easily removed from the reaction chamber.

According to the invention the gas to be treated is acted upon in an insulated chamber of sufficient size with that quantity of oxygen (air) which is required for the formation of sulphur at such temperatures that the reactive nitrogen compounds contained in the gas beside hydrogen sulphide are decomposed.

It is easily possible to recover the sulphur in a pure, fluid form from the gas resulting from this reaction by cooling the reaction media. According to this invention it is further possible to bring the gaseous and vaporous media formed in the said reaction chamber, into contact with suitable catalysts for the purpose of increasing the yield of sulphur, the temperature of the reaction substances being reduced either before or during the treatment with the catalysts.

Finally it is also possible according to the invention to effect the conversion of the gases to be treated with oxygen (air) in a chamber insulated against heat losses, in which chamber suitable catalysts are provided for which support the conversion between hydrogen sulphide and oxygen as for instance catalysts containing chromeoxyde.

In order to decompose the troublesome nitrogen compounds in the gases to be treated it may become necessary to add a larger quantity of oxygen (air) than is required for the conversion of the hydrogen sulphide in elementary sulphur. In case the quantity of oxygen (air) is unfavourably high it is possible according to the invention to add a certain amount of reducing gases as for instance hydrogen or hydrogen containing gases, e. g. purified coal distillation gas to the media formed in the reaction chamber.

With the above and other objects and features of my present invention in view, I shall now describe a preferred embodiment thereof on the lines of the accompanying drawing in which a contrivance for carrying out the invention is shown partly in side view and partly in a vertical section.

The reaction chamber in which the gases to be treated are converted with oxygen (air) is formed by the refractory brickwork 1 which is favourably surrounded by a heat insulating material. At the bottom of the chamber a series of pipes 2 is provided which extend from a distributing chamber 3 and have a certain distance from one another. The pipes 2 traverse the chamber bottom 4.

The hydrogen sulphide containing gas to be treated may be introduced into chamber 3 through pipe 5 in a regulable quantity. The gas is distributed uniformly through the pipes 2 over the whole cross section of the reaction chamber.

The oxygen or the oxygen containing gas (air) required for the conversion is introduced through pipe 6 in a regulable manner. The pipe 6 opens into the intermediate spaces between the pipes 2. The air meets the hydrogen sulphide containing gas introduced through pipes 2, in a layer 7 consisting of refractory bodies arranged above the upper part of the pipes 2 within the reaction chamber. Above the layer 7 furthermore a filling 8 of suitable bodies is provided for which improve the conversion between hydrogen sulphide and oxygen.

According to the invention the filling 8 preferably consists of pipe-like bodies which are made in accordance with the method generally used for the manufacture of refractory bodies by mixing, shaping and burning. These shaped bodies may contain chrome oxide or another substance which improves the reaction between hydrogen sulphide and oxygen or the bricks may be coated with such a substance.

If the contrivance is set into operation first of all the filling 8 of the reaction chamber is brought to the desired high temperature, for instance by burning a suitable fuel gas. If after that the hydrogen sulphide mixed with the required quantity of oxygen (air) is introduced into the chamber to replace the heating gas, the reaction proceeds in the filling 8 all by itself because the required high temperature is maintained by the exothermic reaction between hydrogen sulphide and oxygen.

The gases passed through the filling 8 reach then the free space 9 above the filling. They may be drawn off by means of pipe 10. The gases passing into pipe 10 contain already a considerable quantity of elementary sulphur. Generally 75% of hydrogen sulphide contained in the original gas have been converted into sulphur which may be recovered in fluid form from the gas by means of a simple cooling.

For the cooling of the reaction media a vertical boiler 11 is provided for which may be connected to a vapour collecting vessel 12. But also every other suitable cooling device may be applied in which the gases and vapours are indirectly cooled and the separated fluid sulphur may run off the cooling faces.

At the contrivance shown on the drawing, the fluid sulphur separated by cooling the reaction media collects in chamber 13 below the boiler. The bottom 14 of the collecting chamber 13 is inclined so that the sulphur flows off to the tank 16 through pipe 15.

The reaction gases and vapours remaining in the boiler 11 after the separation of sulphur still contain a considerable amount of sulphur or sulphur compounds. For the recovery of this sulphur a catalyst chamber 17 is provided for at the contrivance shown on the drawing. This chamber 17 is built of refractory brickwork 18. It has a grate-like bottom 19 on which a layer of catalysts is arranged. The catalyst suitably consists of bauxite or another substance which accelerates the conversion of hydrogen sulphide with oxygen to sulphur at comparatively low temperatures.

Below the grate 19 a tank 21 is provided for in which the fluid sulphur leaving the catalyst layer collects. The sulphur flows off the inclined bottom of tank 21 to the collecting tank 16.

The gaseous and vaporous constituents still

existant after the conversion are drawn off the collecting tank 16 through pipe 23 and may be passed through dust chambers, scrubbers or similar contrivances in which the residual injurious sulphur compounds or sulphur dust are removed from the gases. The rest gases escape through a chimney.

The reaction chamber 1 is designed in such a way that it may be brought to such a temperature that the whole nitrogen compounds contained in the gases to be treated are decomposed. The temperature which can be reached depends on the content of hydrogen sulphide in the gases, on the size of the reaction chamber and its heat insulation. If the hydrogen sulphide content of the gas is too low, the gas to be treated is pre-heated in a suitable manner before it is mixed with air as is common practice at the heating of industry furnaces.

The temperature of the reaction chamber should preferably range at least at 900° C. It is, however, advisable to keep it higher and temperatures of 1200–1300 degrees Centigrade have proved very advantageous for the decomposition of the injurious nitrogen compounds into inert constituents.

In the cooler or boiler 11 connected to the reaction chamber 1 the temperature of the reaction media is reduced to such a degree that the elementary sulphur separates in fluid form. The sulphur may for instance settle out at 130–140° C.

If after the removal of sulphur the residual gases shall undergo a further treatment for the recovery of sulphur it is more advantageous to cool the reaction media from the reaction chamber 1 only to a temperature of about 250° C and after that to pass them on at this temperature to the device 17 which is connected to the cooler. The known reaction between hydrogen sulphide and oxygen is only considerably accelerated by catalysts as bauxite at temperatures above 210° C. It would therefore be of little use to bring the gases into contact with the catalyst below this temperature range.

If, however, the temperature of the reaction media is very much reduced in the cooler 11 to let us say 130° C in order to separate the sulphur in fluid form as far as possible in the cooler and the collecting tank connected therewith the gases are heated up again before entering the catalyst device 17 in a suitable way, so that they have a temperature of 220° C or more within the device 17.

Instead of arranging the catalysts in a special device as shown on the drawing at 17 it is also possible to provide them within the cooler or boiler 11. This may be favourable because the heat which is liberated by the conversion of the hydrogensulphide with oxygen at the catalysts is immediately led off so that the catalysts cannot be superheated. The catalysts are in this case inserted in the pipes of the cooler or boiler and are kept there by suitable means as for instance by perforated sheet plates or the like.

If the addition of oxygen (air) to the gases to be treated is higher than necessary for the conversion of the hydrogen sulphide into sulphur and for the decomposition of the injurious nitrogen compounds, the yield of elementary sulphur may be considerably reduced as more sulphur dioxide is formed. In order to attain in this case the highest yield of sulphur possible, the invention provides to add reducing gases and preferably those gases which contain hydrogen to the reaction gases which leave chamber 1. Purified

coal distillation gas may be advantageously used, i. e. a gas which is free of injurious sulphur and nitrogen compounds. If the reducing gas still contains hydrocarbons it is advisable to decompose the latter before the gas is added to the reaction media. Such decomposition may be easily arrived at by treating the gas with a moderate quantity of oxygen (air) at increased temperature whereby the hydrocarbons are decomposed and burnt respectively.

At the contrivance shown on the drawing, the reducing gases may be introduced in regulable

quantities through pipe 24 into pipe 10 which leads from the reaction chamber 1 to the cooler 11.

In the process according to the invention the injurious nitrogen compounds are decomposed up to the formation of inert constituents which cannot react with the sulphur or sulphur compounds any more. The products which result from the decomposition of the nitrogen compounds are therefore essentially nitrogen, carbon dioxide and water.

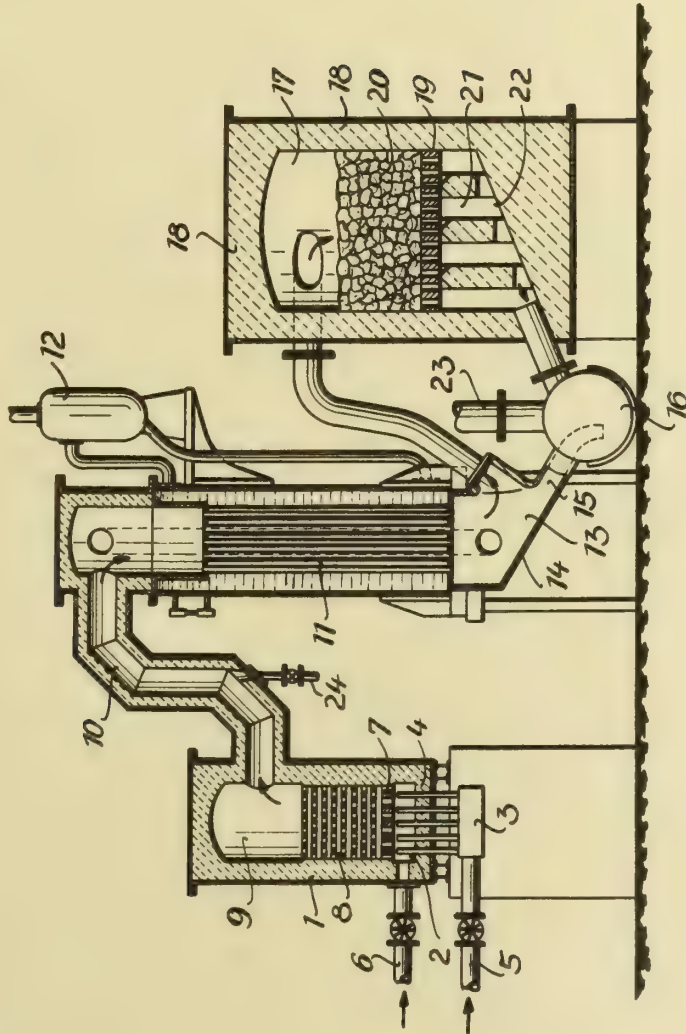
HEINRICH KOPPERS.



PUBLISHED
APRIL 27, 1943.
BY A. P. C.

H. KOPPERS
RECOVERY OF SULPHUR FROM HYDROGEN SULFIDE
OR HYDROGEN SULFIDE CONTAINING GASES
Filed Oct. 23, 1940

Serial No.
362,376



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ALIEN PROPERTY CUSTODIAN

THREADS OF HIGH BENDING STRENGTH

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No Drawing. Application filed October 23, 1940

According to the Patent Application, S. N. 326,536 pipes, plates, rods and the like may be produced out of polyvinyl chloride by processes for spinning or spattering, whereby the polyvinyl chloride is plastified with a great deal of softeners, formed and treated with solvents which solve the used softeners. Thus, hard and strong products may be obtained.

Now it has been found that threads of small cross section which are manufactured out of polyvinyl chloride plastified by a great deal of softeners, and extracted with liquids solving completely or partially the used softeners but not substantially solving the polyvinyl chloride, yield filaments being not hard but surprisingly flexible. These threads, therefore, may be used for textile filaments, whereby their resistance against air, sun, aging and chemical agents of most different nature is advantageous.

Threads out of highest molecular polyvinyl chloride the manufacture of which is shown in the Patent Application S. N. 203,674, and according to the method of invention are especially advantageous. They do not only have the known excellent properties in regard to mechanical and chemical resistance but they also have an excellent resistance to tearing and bending strength that is properties being specially important for the intended use.

Otherwise, the threads out of polyvinyl chloride according to the invention are surprisingly resistant to heat in contrast to the threads known until now: They may even be treated with boiling water. Therefore they give the basis not only for textile fabrics for special uses but also for fabrics which may be generally used.

A further advantage of the new method lies in the fact that an unusually high speed of spinning may be applied in spinning processes especially if highest molecular polyvinyl chloride with high addition of softeners are used.

Example

100 parts by weight of powdery high molecular polyvinyl chloride according to the Patent Application S. N. 203,674 are mixed well with 200 parts by weight of trikresyl-phosphate and 4 parts by weight of stearic acid. The powder is heated up to 100° C until the softener is completely absorbed and the powder feels dry. Then it is extruded in a spattering machine through a nozzle of 0.5 mm width, whereby the corresponding temperatures of the endless screw, of the head and of the nozzle are 120°, 150° resp. 220°. The thread leaving the nozzle in a nearly fluid state is reeled upon a drum with a speed of spinning of 700 m per minute. The softeners of the obtained thread are extracted by acetone whereby the threads keep their satisfying flexibility, their resistance to tearing and knotting and their excellent surface-qualities.

Their mechanical properties may further be improved by methods of stretching whereby all the known modifications are applicable. The stretching may be applied in the acetone-bath or subsequently if necessary at high temperature. The threads may further be improved by a thermal after-treatment if necessary in a dry state, whereby they may be heated up nearly to the flow limit.

These threads out of very high molecular polyvinyl chloride are suitable for all goods where rubber must be used until now, because they have favorable mechanical properties and show a constant high elasticity. Otherwise they do not age. For instance braces, garters, corsets, elastic bandages and the like may be produced. Threads out of polyvinyl chloride being not so high molecular, cannot be applied for such uses because they are too plastic.

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MARTIN DORIAT.
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ALBERT EINSTEIN'S THEORY OF RELATIVITY

THEORY OF SPECIAL RELATIVITY

THEORY OF GENERAL RELATIVITY

THEORY OF QUANTUM MECHANICS

THEORY OF COSMOLOGY

THEORY OF ATOMIC PHYSICS

THEORY OF ELECTRICITY AND MAGNETISM

THEORY OF OPTICS

THEORY OF MECHANICS

THEORY OF THERMODYNAMICS

THEORY OF CHEMISTRY

THEORY OF BIOLOGY

THEORY OF PSYCHOLOGY

THEORY OF PHILOSOPHY

THEORY OF ART

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THEORY OF TELEVISION

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ALIEN PROPERTY CUSTODIAN

REINFORCED DOOR OF WOOD AND/OR INSULATION MATERIAL

Johannes Brynjulvsen Een, Oslo, Norway; vested
in the Alien Property Custodian

Application filed October 23, 1940

The present invention relates to a reinforced door of wood and/or insulation-material, to be used in rooms, halls, lofts and cellars, gates, garages and such like.

The object of the invention is to provide a door, which in a known way is manufactured with coveringplates of veneer or such like, with reinforcing-bars between the coveringplates instead of the usual intermediate layer of wood or such like material, by which the coveringplates in usual way are connected to each other and the door is given the necessary solidity. The reinforcing-bars are also beside connecting the coveringplates to each other holding them at an adapt distance from each other, so that the door gets a suitable thickness and strength against torsion and other bad shapes.

A further object is the arranging of insulating-plates inside the covering-plates, between the reinforcing-bars, which insulating-plates, if possible may be covered with metalplates, are insulating against warmth, cold and sounds, and between them a fireproof insulating-plate may be arranged or another fire-proof insulating material may be inlaid, so that the door besides insulating against warmth etc. as mentioned also is fireproof. The fireproof plates or material may also be arranged nearest to the covering-plates, perhaps with wave-board or such like as intermediate layer.

Further objects are the especial form of a gas-tight tightening-list, an especial door-hinge and some details by the reinforcing-bars etc., which all will be nearer described below.

In the accompanying drawings various forms of the invention are skeleton-like shown by way of examples.

Fig. 1 is an elevation of a door according to the invention on a small scale, and by broken lines is shown an alternative for inlaying of the reinforcing-bars in the door.

Fig. 2 shows on a full scale a plan cut from the border a little way into the door, through a list of veneer-covered wood, which cover the border-plain, the covering veneer-plates and the reinforcing-bars.

Fig. 3 shows an execution of the door, manufactured by especial thin veneer-plates with by glue or in another way fastened ribs of wood or other fitting material inside the covering-plates for fastening for the teeth on the reinforcing-bars.

Fig. 4 shows an outcut from the border of the door, where the nearest covering-plate is taken

away, and one can see the arrangement of the reinforcing-bars by the border of the door.

Fig. 5 shows the same as Fig. 2, but insulating-plates are arranged between them inside the covering-plates.

Fig. 6 shows the same as fig. 2 and 5, but with a border-covering-list of metal and with a fire-proof plate or a fire-proof material inlaid between the insulating-plates.

Fig. 7 shows a door according to the invention with fire-proof insulating-plates inside the covering-plates and with an intermediate layer of sheet-iron or an iron-net between the covering-and the insulating-plates, and also with border-covering of metal, by which a tightening-list for gas-tight closing of the door is arranged.

Fig. 8 shows a modified arrangement for fastening for the tightening-list.

Fig. 9 shows a side-view and a quercut of a part of a single reinforcing-bar in full scale.

Fig. 10 and 11 show a side-view and quercut of two different executions of double reinforcing-bars.

Fig. 12 shows from before seen a hinge for doors with border-covering of metal.

Fig. 13 shows a horizontal-cut through the hinge of a door with border-covering of metal without tightening-list in frame of steel.

Fig. 14 shows the same as fig. 12, but the border-covering is here supplied with a tightening-list.

Fig. 15 shows the form of the hinge and the arranging of this inside the border-covering, and

Fig. 16 shows a fastening-iron for the hinge, which iron itself is fastened to the reinforcing-bar, which is lying nearest to the border.

The covering-plates 1 and 2 of veneer or another fitting material are mutual firm connected by each other with suitable distance between them by means of reinforcing-bars 3, which along both the borders are formed with in the covering-plates entering teeth 4, as the breadth(height) of the reinforcing-bars 3 is fitted after the wished distance between the covering-plates 1,2, and the thickness of the bars is fitted after the wished stiffness in the reinforcing and in the reinforcing-teeth 4.

The simplest and lightest forming a door according to the invention is shown in Figs. 2 and 3, which show the door formed of two covering-plates 1,2, the necessary number of reinforcing-bars 3 and one along the border of the door running list 5, which covers the borderplains and enters between the borderplains. This list is to hold the borders of the covering-plates firm to-

gether formed with an against the door turning, lengthways running rib 6 on each side, which rib is pressed into corresponding grooves in the covering-plates 1,2 border-plains. In Fig. 2 is also indicated, how the border-list 5 may be connected to the covering-plates by means of small reinforced bars 3a, which have teeth as well at the borders as at the one end.

By the in Fig. 3 shown form are the cover-plates 1,2 too thin to give necessary fastening for the teeth on the reinforcing bars, as these must not put out outside the covering-plates. Therefore are inside the covering-plates, between these and the reinforcing-bars, with glue or in another way strength-ribs of wood or other fitted material fastened for fastening for the teeth 4 on the reinforcing-bars 3.

By the performance, which is shown in Fig. 5, insulation-plates 8 for insulation against warmth, cold and sounds are arranged inside the covering-plates, between the reinforcing-bars. These plates are put in between the covering-plates, before the border-covering-lists 5 are to be placed on the door, and a plate 9 of wave-board or such like between them is holding the insulating-plates pressed against the covering-plates 1,2.

By the form shown in Fig. 6 is in addition to the insulating-plates 8 between these also arranged a fire-proof plate, or a fire-proof material is inlaid, so that the one covering-plate will be fire-proof insulated from the other one. That is this figure shown border-covering 11 of metal, whose sides are bended into a right angle and covering the border-plain of the covering-plates 1,2, has edges bended into a right angle 12, which are pressed into grooves outside the covering-plates 1,2, whereby is attained that the border-covering is fastened to the border of the door without use of screws or other especial fastening-means.

By the form shown in Fig. 7 there are arranged fireproof insulating-plates 13 inside the covering-plates 1,2. Between the insulating-plates 13 is here also inlaid a intermediate layer 9 of wave-board or the like. To hold the insulating-plates at position even if the one covering-plate by fire should be destroyed, there are arranged hooks 14 (Figs. 5 and 9) on the reinforcing-bars, or there is for example arranged a thin iron-plate 15 between the covering-plates and the insulating-plates. This iron-plate is then selected as thin that the teeth of the reinforcing-bars simply are pressed through the plate by pressing into the wood. There may also instead of an iron-plate be laid a preferably fine-meshed netting 16 between the covering-plates and the insulating-plates. The in Fig. 6 shown border-covering 17 of metal is formed with an inwards enlarged groove 18 wherein is arranged a tightening-list 19 of rubber or other tight, elastic material. This tightening-list 19 is formed with a tubular part 19a and in a piece with this formed handle-formed part 19b, which is thinnest nearest to the tubular part and thicker to the end, that is gets a good fastening in the inwards enlarged groove 18 in the border-covering. For the matter of the tightening the rubber-list is so formed that a tightening part 21 is lying against the borders of the groove 18. The groove 18 and the handle-formed part 19b may also be formed with parallel sides as indicated in Fig. 8, and the both parts are then formed with grooves in the longitudinal direction or with other roughness for fastening for the handle-formed part of the

tightening-list in the groove. The tightening part 19a of this list is tubular and agreeable to the invention so arranged, that it putting with the one side against the door-impact 22, does be bended over to the door-case itself 23, so that there will be shaped two in 90° angle at proportion to each other standing tightening-flats with a between them lying air-canal 24 in the corner between the door-impact 22 and the door-case 23. When the pressure against the door-impact ceases, the pressure against the door-case ceases too, and the door does go freely in and out in this.

The simple reinforcing-bar 3, shown in fig. 9, is stamped out of a band-formed material and formed with spear-point-formed teeth 4, which to enlarge the strength are bended at the querdirection. Reinforcing-bars for doors with fire-proof insulating-inlay may be formed with hooks 14, existing of separately teeth, stamped out of the bar-material and bended into a right angle to the bar-plan. These hook-arrangements will hold the insulating-plates at position, also if the one covering-plate by fire should be burnt up. To prevent the passing over from the one border to the other one on the reinforcing-bar of heating by fire, there are between each pair of teeth (one on each side of the bar) stamped out a hole 26 in the middle of the bar. In special cases it may be effective to use double or compound reinforcing-bars, which for example are shown in Figs. 10 and 11, where respectively is shown a bar, compound of two bars with U-formed querdirection 27, and with toothed borders, and with the back-flats firm connected to each other, and a bar compound of two single bars of the same type as shown in Fig. 8, which are connected to each other with between them lying connecting-pieces 28 with down-turned taps 28a, which are firm riveted to the bars 3. Where border-covering-lists of wood are used (Figs. 2 and 5), it is of importance that the lists are firm connected with the covering-plates. For this object the reinforcing-bars on the ends may be formed with extra teeth 4a, which will be pressed into the border-list, when this does be pressed at position in the door, as the reinforcing-bars in that case must be so adjusted, that the teeth 4a just are in position to be pressed into the border-lists, when these do be put on. On the sides of the door, where normally none reinforcing-bars are ending, there may be inlaid short pieces 3a of reinforcing-bars with extra teeth 4a, turning against the border-list (Fig. 2).

The reinforcing may be performed with whole reinforcing-bars or with such cut up into shorter or longer pieces. The reinforcing-bars may also be bended in any suitable geometrical form, and the forming in details may of course be varied in different manners.

By the in Figs. 12-16 shown form and arranging of the hinges for a door with border-covering of metal in steel-case the fastening-plates 30 of the hinge 29 are arranged inside as well the border-covering 11 as the steel-case 31, as the plates 30 by means of horizontal slits 32 are parted into for example 5 parts 30, which through slits in the bended outward planes of the border-covering 11 and in the steel-case 31 are put inside these parts, where they are fastened directly in the steel-case with from the outside through the case put machine-screws 33, whose heads are senked down in the case, and for which treaded holes are arranged in the fastening-plates 30 on the concerning side of the

hinge, while they in the door are fastened at a for that purpose arranged fastening-iron 34, which may be fastened to an extra reinforcing-bar 35, or to the ordinary by the door-border lying reinforcing-bar 3, which then is to be arranged at one regarding hereto suitable distance from the door-case. The hinges are then to be fastened to the iron 34, and the border-covering 11 by means of through this and the plate 30 freely carried machine-screws 36, for which threaded holes 37 are arranged in the fastening-iron 34.

The advantages by parting the fastening-plates and the arranging of these on the border-coverings inside the steel-cases are a consequence of that thereby is shunned weakening of the

border-covering and the door-case by a proportionally long slit, which a not parted fastening-plate would stipulate, and that as well the border-covering as the door-case constitute unbroken quite plain planes.

The advantages by the invention in its entirety lie in the possibilities for a extraordinary rational manufacturing, in that the material for connecting of the covering-plates not can be influenced by climatic actions, so that the door does be quite stable, and as it appears from the preceding, the extensive practicability to as it will all objects where altogether doors of wood or composition-material may be brought to employment.

JOHANNES BRYNJULVSEN EEN.

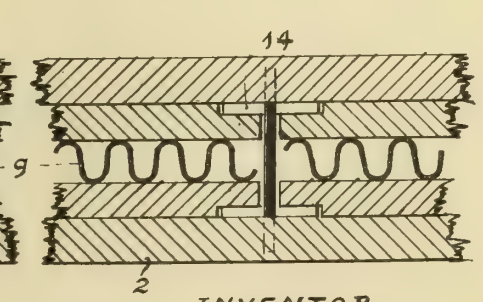
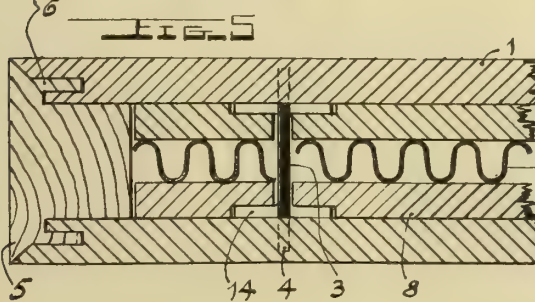
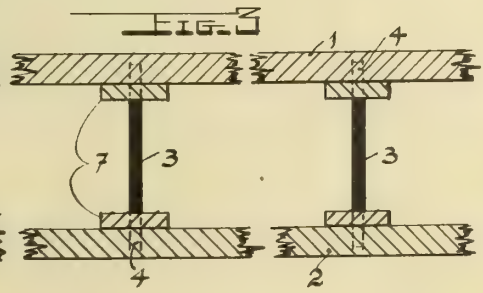
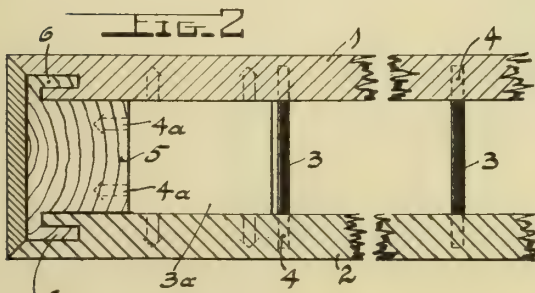
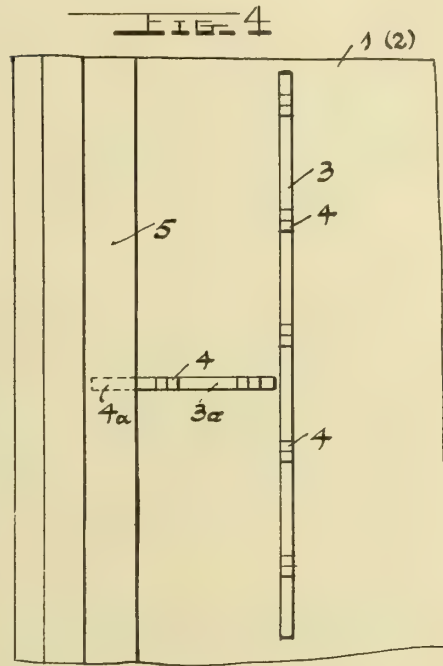
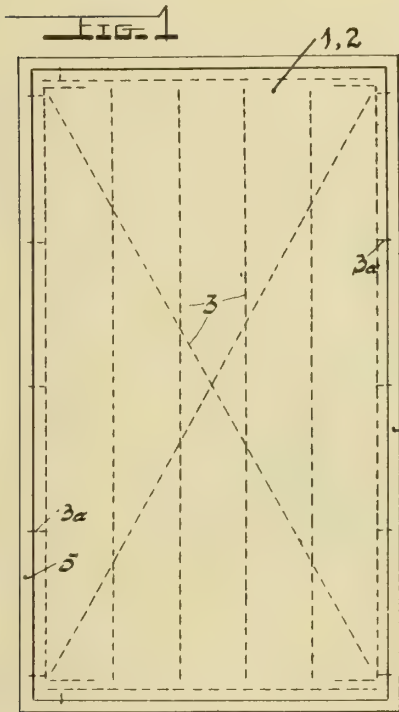


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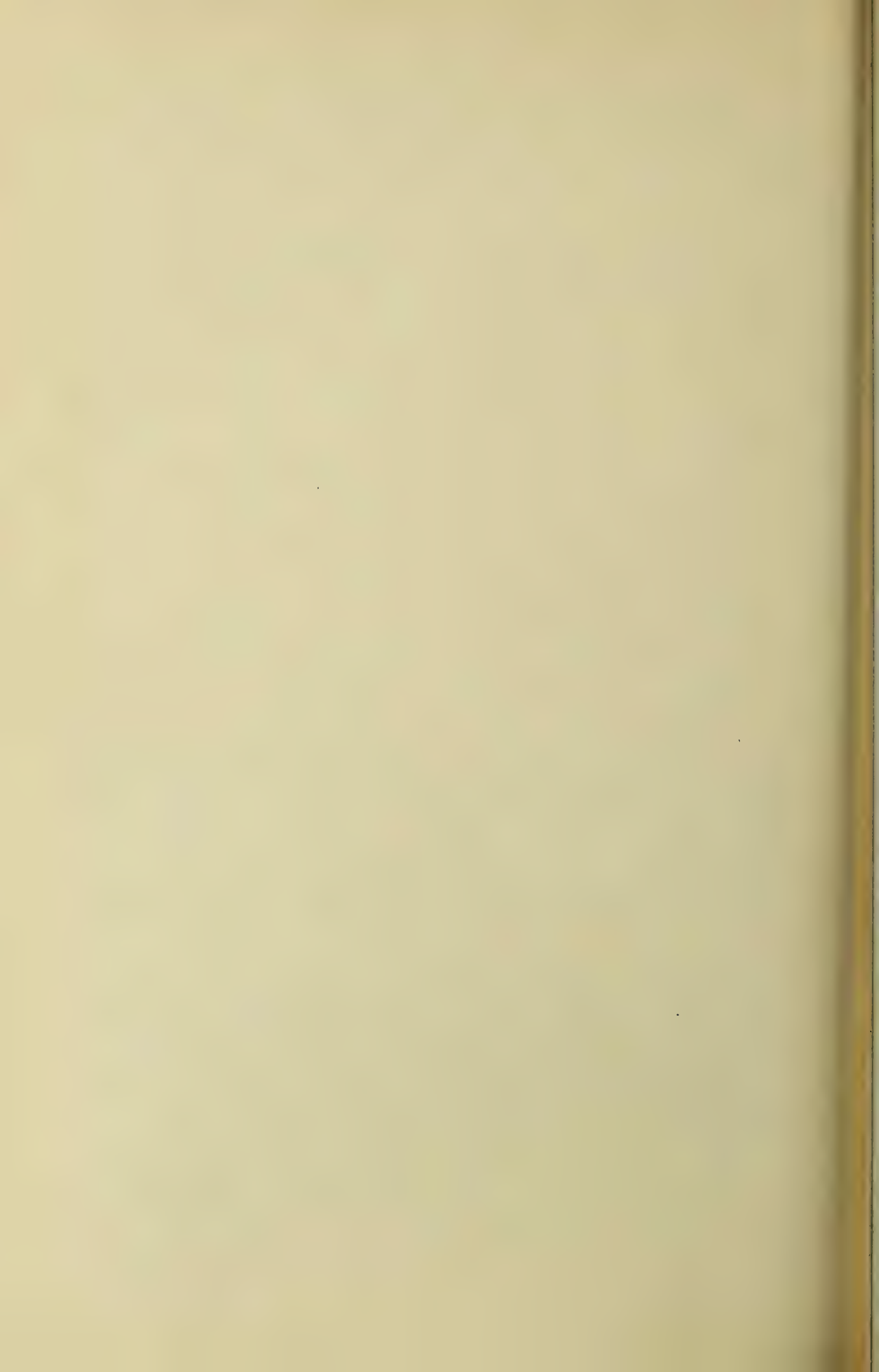
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3 Sheets-Sheet 1



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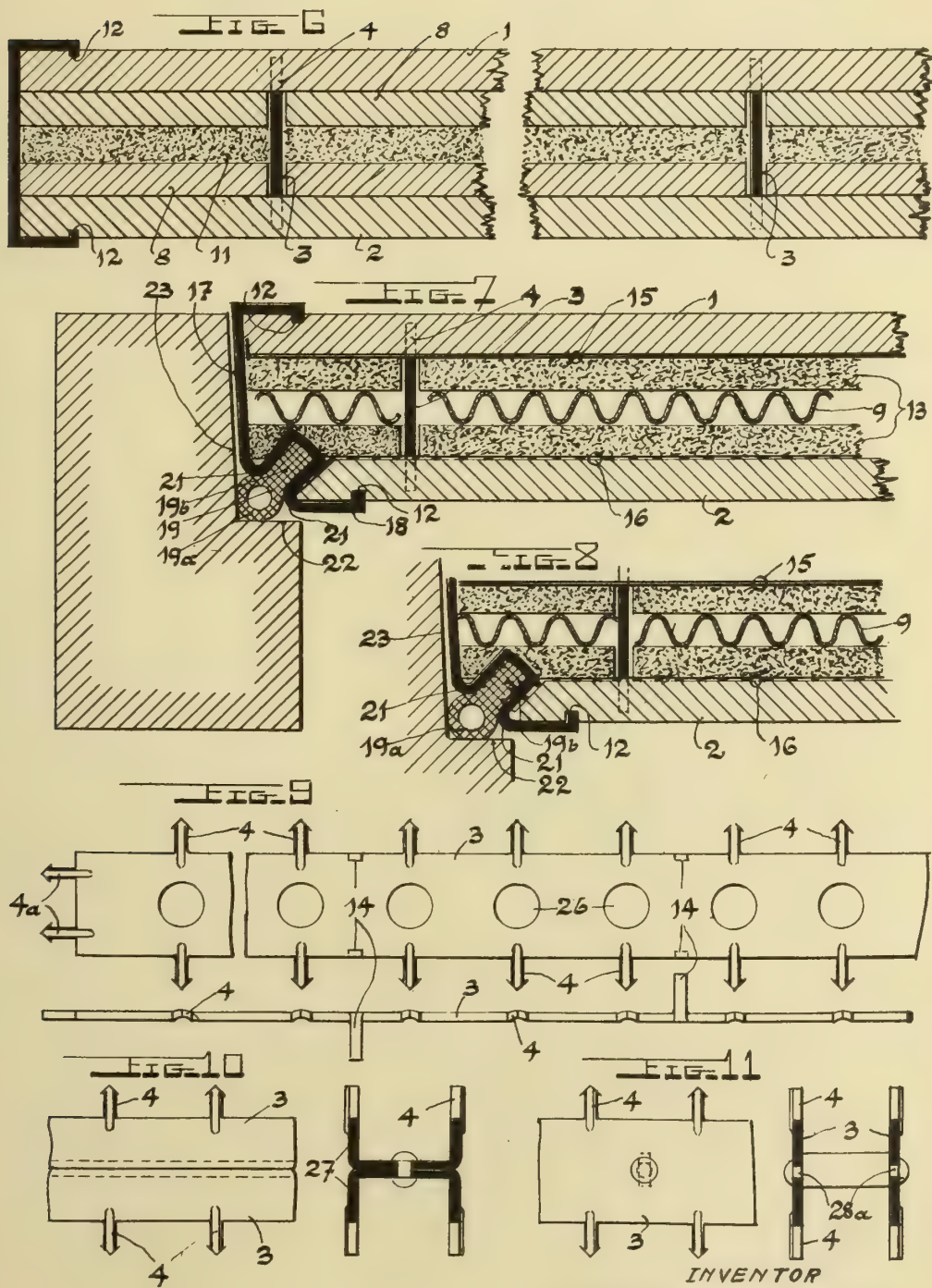
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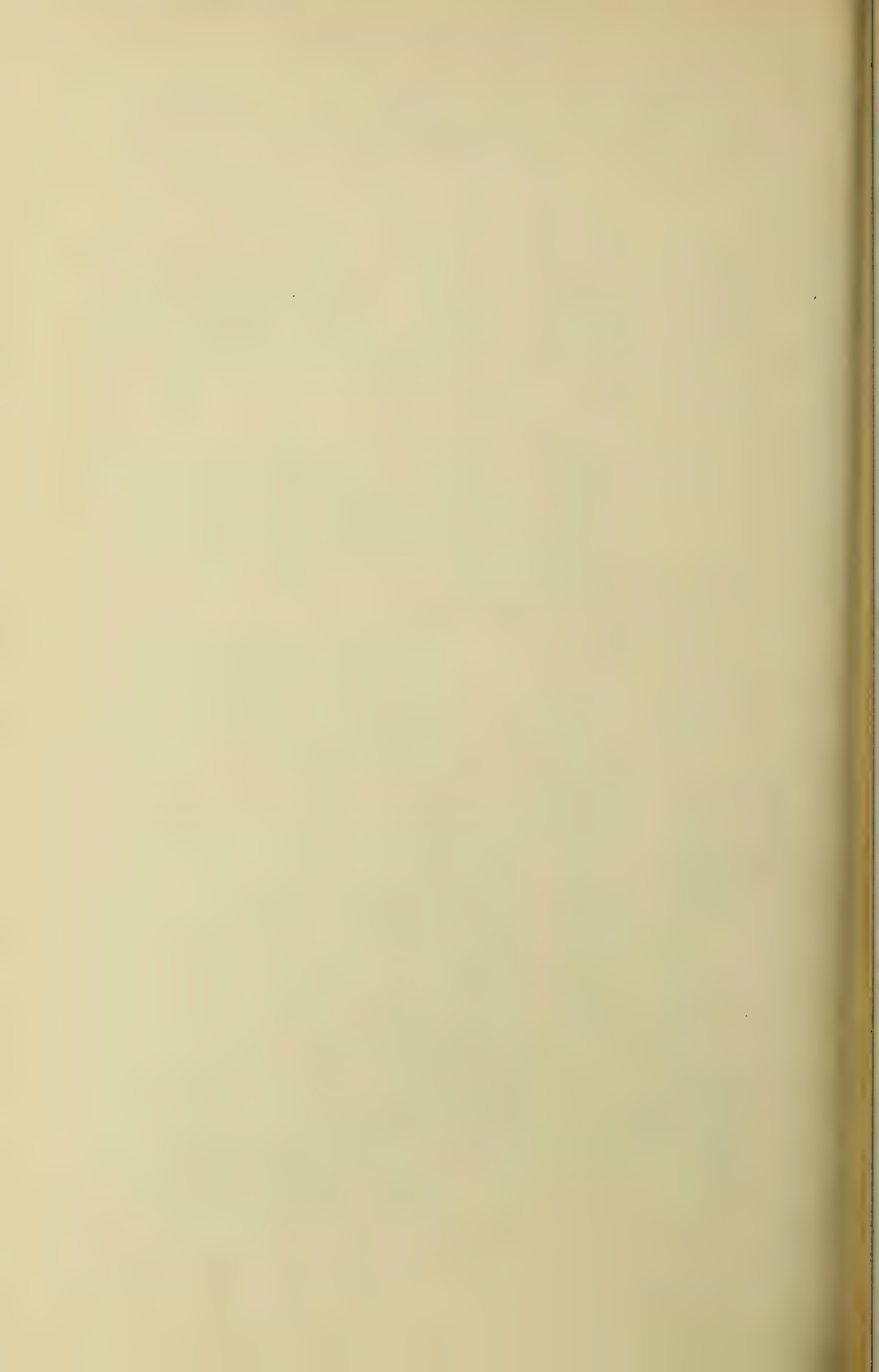
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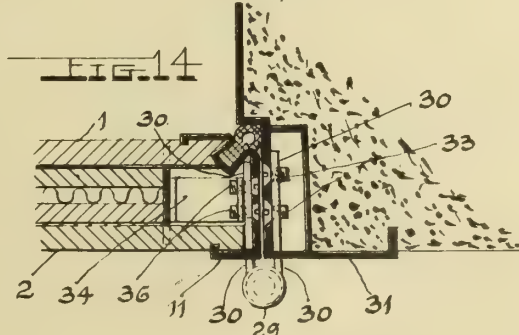
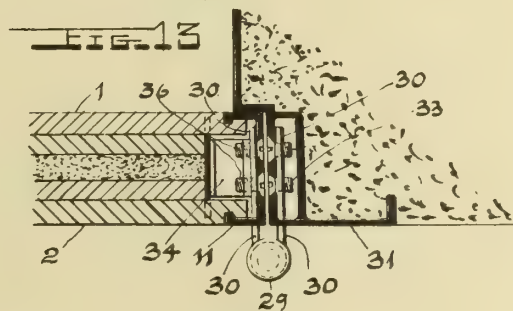
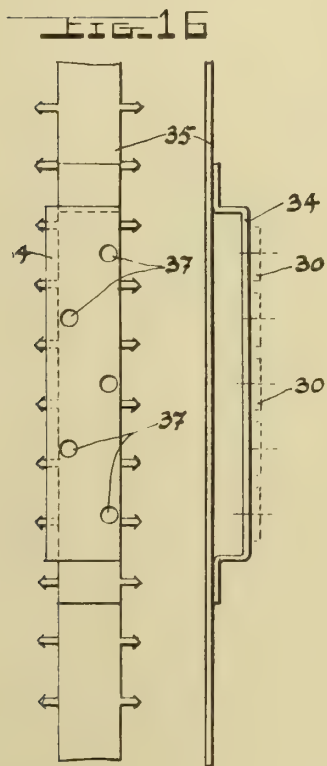
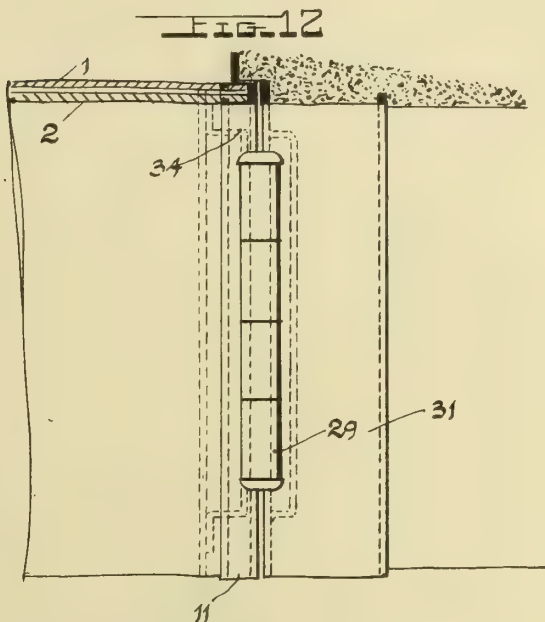
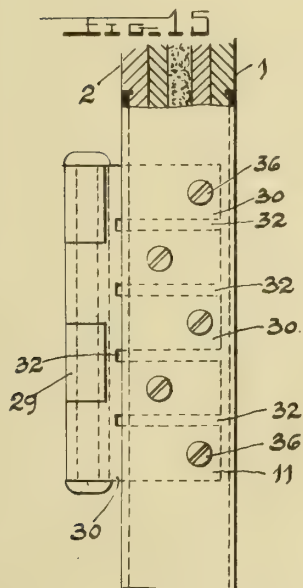
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3 Sheets-Sheet 3



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ALIEN PROPERTY CUSTODIAN

METHOD OF MANUFACTURING WOOL OR SILK-LIKE FIBRES FROM THE COLLAGEN SUCH AS FATTY LAYERS, TENDONS, ETC. OF ANIMALS

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Custodian

Application filed October 23, 1940

The present invention relates to a method of manufacturing wool or silk-like fibre from the collagen of marine animals, especially the whale and shark and the tendons of the whale, shark and cattle and the tissue surrounding the sperm head oil of the sperm whale.

The primary object of this invention is to produce the tenacious spinnable fibre to be substituted as wool or milk from the residues left after oil is pressed out from the fatty layers and other parts of marine animals such as the whale and shark as well as land animals. Another object is to remove useless substances from the fibre without damaging the latter and also to facilitate the separation of the fibre.

The further object is to render said fibre water-proof by treating the same with a fixing agent such as formalin and chromium chloride.

The fatty layers of the whale, shark, etc. generally consist of about 65% of oil and fat and 20% of fibre, the rest being elastin and water. Said fibre constitutes a irregular three dimensional network. Especially, the one running obliquely along the length of the body is long. For instance, in the bladders of the blue whale there are not a few which with the thickness of only about 5 cm. have a longitudinal fibre of 50 cm. long and a lateral fibre of 20 cm. long.

Hitherto, the collagens of whales have been used to obtain oil by the boiling process, which however has the disadvantage of giving a color and bad smell to the oil and dissolving the fibre and thus making it useless.

Now, according to the present invention it is possible to produce fibre of superior quality free from the above defect and also without damaging it mechanically as well as the oil and fat free from the above defect.

This invention is characterised by firstly pressing out oil from the fatty layers, tendons, etc. of whales, sharks, etc. by means of compressing the fibre with a rough compressing machine consisting of rollers of corrugated surfaces and a compressing machine consisting of rollers having network grooves; next compressing and broadening such net-work fibre slowly by a broadening and reeling rollers; opening it by the needles planted at the periphery of a rotating drum; scratching off the lateral fibre while the longitudinal ones is reeled in an orderly state or if necessary, scratching off the longitudinal and lateral fibres by the needles, treating the small quantities of fatty oil and elastin, which remain attached on them, with enzyme such as protease, lypase, etc. or an aqueous solution mixed with a

small quantity of cow's milk and fermenting the same at below 40° C., removing the above foreign matters by washing them with a washing agent, pressing and elongating the fibres with a blunt knife edge, while the part of the fibre in contact with the back of the blade is compressed and expanded, so that the fibres are separated automatically, and finally treating them with a fixing agent such as formalin, chromium chloride, etc. to render them water-proof.

According to this invention, it is possible to easily remove useless substances without spoiling the fibres and also to produce wool or silk-like tenacious fibres from the residue remaining after oil is pressed out.

The present method may be divided into the following five steps:

(A) Compressing steps

In a compressing apparatus constituted by connecting one or more of each rough compressing machine consisting of rollers of corrugated surfaces and a compressing machine consisting of rollers having network grooves, the fatty layer or tendon of the whale, shark, cattle, etc. cut in suitable breadth is guided between the rollers of said rough pressing machine, regulating the space between the rollers suitably according to their thickness, so that they may be pressed roughly and the oil be pressed out. Next, their network tissue is compressed perfectly by guiding them between the rollers of said compressing machine. Thus, by this step excellent oil cannot only be obtained without the fatty layer slipping out, but also the fibre may be collected in a good condition without being spoiled by compressing.

(B) Opening step

The fibre as it is in a compressed and dried condition still has a three-dimensional network structure and is hardened, but becomes tenacious when kept in a slightly moist condition, namely, undried condition. In such condition it is fed between the broadening rollers to be compressed thin and broad. Next, supporting the fibres with a plate having an uneven end surface like a comb, the lateral fibres are scratched off and collected by the points of the needles which are planted on the surface of a rotating drum and next are transferred to the needles of the similar drum rotating in the opposite direction while the longitudinal fibres are pressed strongly by reeling rollers, as they are in a parallel state. If necessary, omitting the reeling rollers, the longitudinal and lat-

eral fibres may be scratched off by the points of the needles of the rotating drum.

When the fibre is easily separated from its knot owing to its moist condition and scratched off by the needle head while the longitudinal fibre is reeled by separate rollers, it is taken continuously by the rollers because of a dissolved glutinous substance. The lateral fibres scratched off by the needle heads are detached from the needle points and put at the appointed place, while the longitudinal long fibres directly receive the next separating step without the necessity of being arranged in order again.

Generally, the three dimensional network fibre as such is very hard to break and open by thrusting the needles. Moreover, it is pulled by the needles and elongated more narrow. Besides, as the needles must be thick and strong for that purpose, it is necessary to plant a small number of them in rows, maintaining a fairly wide space between them for the breadth of the fibre structure. As regards the result of the opening, the main part of the lateral fibres still remain attached on the longitudinal fibres, and it is a big task to put them in order. But if the fibres are compressed and broadened by the broadening rollers as in this invention, they become thin and broad without spoiling themselves, and as they become broad, more needles can be put in operation for the same size of the material. Also, as they become thin, they may be scratched and torn sufficiently by comparatively small needles with the smaller force. In short, they may be scratched by planting many small needles thickly on the rotating drum throughout its entire breadth. Moreover, they are scratched by the needle points in the grooves of a comb-teeth shaped resisting plate disposed near the supporting rollers, so they are opened perfectly without the disadvantage of the tissue being extended narrow. Also, the lateral fibres can be separated completely from the longitudinal fibres.

(C) Fermenting step

This is the step of treating the small quantities of fatty oil and elastin remaining attached on the fibre after the main part of the oil and elastin is pressed out, with enzyme such as protease, lipase, etc. or an aqueous solution of cow's milk, fermenting the same at below 40° C. and removing the foreign matters by washing them with a washing agent.

By this step, the above undesirable matters are removed to make the fibre easily separable without spoiling it. When it is dried, it can be made into a soft condition.

(D) Separating step

The fibres of animals, for example, the whale and shark which are naturally long are stuck together by a glutinous sticky solution and form a bundle, and if they are separated by removing said solution completely with a chemical, they are damaged considerably.

Now, according to this invention, utilizing the elastic property of these fibres they are stroked with a blunt knife edge to broaden the stroked part, while the part in contact with the back of the blade is compressed and expanded, so that the fibres are automatically separated or placed in an easily-separable condition. If they are rubbed repeatedly with an edged tool provided at the periphery of a rotating drum while being delivered slowly with feeding rollers, the glutinous matter is taken away, thus making it pos-

sible to separate them. At the same time, their knots too are removed.

Thus, after finally stroking all the parts of the fibre except the part supported by the delivery rollers, reverse its direction and stroke it as before. Then, the knots of its head and root will be removed, making it fit as spinning fibre. Unlike those treated with a chemical, it may be separated perfectly retaining the original strength of the fibre.

(E) Water proof treatment

Since the fibre which has undergone the before-mentioned treatment is not water-proof as it is, it is subjected to water-proof treatment so that it is not hardened even when moistened and holds in molecules among the fibre therefore is light and helps the preservation of warmth (as cloths), furthermore, it can stand the subsequent operations sufficiently, for instance, dyeing, washing, etc. The accompanying drawings show an example of the embodiment of the apparatus suitable for carrying out the present process.

Figure 1 is a side view partly in section of a machine for compressing the fatty layers of marine animals such as the whale and shark or the tendons of the whale, shark and cattle;

Figure 2, its front view showing the front of a rough compressing roller;

Figure 3, a side view of the above roller partly in section;

Figure 4, an enlarged front view of the compressing roller of the compressing machine;

Figure 5, a cross sectional side view of an opening machine;

Figure 6, its plan;

Figure 7, a front view of an opening roller cut off along the line (VII)—(VII) of Figures 4 and 5;

Figure 8, a side view in longitudinal section of a separating machine and

Figure 9, its plan.

The following is the further explanation of each step of this invention with reference to the accompanying drawings:

In the drawings, A is a rough compressing machine consisting of a pair of upper and lower rollers 1 and 2 of corrugated surfaces; and B, a compressing machine consisting of a pair of upper and lower rollers (3) and (4) having network grooves.

These two machines A and B form a compressing machine, one or more of each of the above rough compressing machine and compressing machine are connected together. The rollers 1 and 2 are secured to the supports 9 of both sides by the bearings 7 and 8 of transversal shafts 5 and 6. The transversal shaft 6 is connected suitably to a prime mover by a gear 11. Also, gears 13 and 14 are connected. The bearing 7 is connected with a handle 24 by a worm bevel gear 16, a worm bevel gear 17 engaged with it, a vertical shaft 22, bevel gears 18 and 19 and a transversal shaft 23, so that it may be moved up and down suitably through a guide groove 10 by said handle 24 so as to regulate the space between the rollers 1 and 2 according to the thickness of the fatty layer or tendon of an animal to be fed between them. The rollers 3 and 4 are secured to the supports 29 of both sides by the bearings 27 and 28 of transversal shafts 25 and 26. The motion-transmitting device and the device for regulating the space between the rollers by a handle are substantially the same with those in the before-mentioned rough compressing machine A. The

rollers 3 and 4 have the rotating speed increased successively according to the degree of the elongation of said fatty layer and tendon.

Generally, the collagen and tendon of the whale are covered with oozing oil. Especially, the fatty layer is so thick that if it is fed between the rollers without any device the latter skid and consequently it is extremely difficult to compress it. Under the circumstances, manufacturers of whale oil have hitherto relied upon the boiling process, in which however the fibre is hydrolized by boiling and absorbed on the oil. Thus, the oil is not only spoiled, changing its color and having a bad smell owing to the putrifaction of the protein, but also the fibre inevitably becomes useless.

But in this apparatus, the fresh fatty layer and tendon are firstly fed between the rollers 1 and 2 of the rough compressing machine A at below 30° C. as they are long, while being delivered by a conveyor and are compressed roughly, travelling zigzaz, and after thus compressing them to some extent and pressing out the oil, they are again fed between the rollers 3 and 4 of the compressing machine B and then are compressed well, supporting them tightly with the network uneven surfaces of said rollers. In this way, it is not merely possible to press out about 50-75% of colorless and odorless oil of superior quality, but also to compress its network tissue. A fibre bundle consisting of many single fibres and a network tissue are hardened by the ordinary compression, for example, a hydraulic press, rendering the subsequent opening operation difficult and requiring much time for the operation. But if the operation is carried out to the last by using together the rough pressing machine A consisting of the rollers 1 and 2 of corrugated surfaces and the compressing machine B consisting of the rollers 3 and 4 of network grooves, the product may be obtained efficiently in a large quantity without the above apprehension, and if the raw material is treated suitably after the oil is pressed out, a network tissue can be obtained. By separating this tissue there is obtained a product which is tenacious and can preserve warmth and therefore is fit as spinning fibre. The oil pressed out is collected in a tank 30, from where it is stored in a reservoir 31.

By carrying out the opening and compressing steps continuously the efficiency may be further increased. The opening step is carried out by the opening machine shown in Figs. 5 and 7. After the oil is pressed out by the said compressing machine, the network tissue is fed to a broadening and reeling rollers at suitable intervals.

Delivering it out slowly, broadening it by compression with the broadening rollers and then supporting it with a plate of a saw toothed end surface, it is opened by the needles planted at the periphery of a relatively quickly rotating drum and the lateral fibres are scratched off by said needles, while the long longitudinal fibres are reeled by the reeling rollers as they are arranged in good order. Thus, it is possible to separate the longitudinal and lateral fibres from each other by a simple means. In some cases, the longitudinal fibres may be scratched off together with the lateral fibres by the needles of said rotating drum. In the drawings, C and E are reeling rollers; and D, a pair of broadening rollers, which receive motion from a pulley 41 by toothed wheels 35-40 through gears 32 and 34 and are rotated by a toothed wheel 43 engaged

with the gear 34 provided with a rotating drum F which has a number of hook-shaped needles 42 planted at its periphery and also are moved in conjunction with another reeling roller G which is driven in conjunction with the pulley 41 by a toothed wheel 45 turned by the rotation of the gear 32 and an oppositely rotating drum K having a number of straight needles 44 at its periphery in a similar manner as F the rotating speed of said roller G being a little quicker than that of the broadening rollers D, while the speed of said rotating drums F and K is far quicker than theirs. The front face of the reeling roller E is provided at the end surface with a plate 46 having a saw-toothed end surface, so that by passing the point of each needle 42 of said rotating drum F through the recess of the saw-toothed part of the plate 46 the drum F may be rotated freely.

The network fibres of the whale, shark, etc. from which oil has been pressed out by a compressing machine are fed in somewhat moist condition to the reeling and broadening rollers C, E and D, when they are broadened right and left, while being compressed, and then the long longitudinal fibres are bent downward over the pointed part of the end of the plate 46 so as to be reeled slowly by said roller G. At the same time, by the rotation of the drum F the network fibres supported on the plate are partly pressed into the recesses of the plate by the points of the hook-shaped needles 212 and the lateral fibres are not only scratched off in turns by the heads of the needles 42, but also such scratched-off lateral fibres are detached by the needles 44 of the rotating drum K and released into a water tank 49 by the water jetted from the nozzle 48 of a water feed pipe 47 and collected there by a netting or the like. In this case, if necessary, omitting the above reeling roller G, the longitudinal and lateral fibres may be scratched off by the needles 42 and 44 of the rotating drums F and K alone and be collected similarly in the water tank 49. As the network fibre is broadened thin by the broadening roller, a comparatively large number of needles may be used according to its breadth to pierce its surface. Also, by supporting the fibres from under on the uneven surface of the plate, thus giving them resistance and pressing them into the recesses of the plate partially by the needles, the lateral fibres are scratched off, so that the network fibre may be opened easily and perfectly. The lateral fibres are not only separated from their knots, but also the longitudinal fibres which pass through the recesses of the plate are connected successively by their glutinous matter and reeled down all together by the roller G as they are arranged in good order.

Therefore, there is no fear of the fibres being broken because of opening. As according to this method the longitudinal and lateral fibres are separated from each other easily and the long longitudinal fibres may be collected as they are arranged in good order, the separating step may be carried out directly after.

By the way, the above rollers C, D and E can have the space between them regulated suitably by handles 50, 51 and 52 respectively.

The following is an explanation of the fermenting step:

After treating the collagens of the whale and shark or the tendons of the whale, shark and cattle by the first and second steps, the fibres which have small quantities of fatty oil and elastin remain attached on them are put into a

porcelain bottle or concrete tank, and after pouring water into them, enzyme such as protease and lipase or a small quantity of cow's milk is added and then the fibres are left alone for 24 hours, whereupon elastin is almost completely fermented and decomposed. After squeezing out the elastin, they are washed with a washing agent, for instance, a washing agent consisting mainly of high grade alcohol and ester sulphate or Marseille soap and then is dried. Thus, said foreign matters are removed in a relatively short space of time and also the fibres are made tenacious and easily separable without being spoiled as when a strong acidic or alkaline solvent is employed. The above step may be applied with the same good effect to not only the collagen of the whale and shark, but also the tendons of the whale, shark and cattle and the tissues surrounding the sperm head oil of the sperm whale.

Next, the separating step is performed by the separating machine shown in Figures 8 and 9, in which 53 and 54 are the delivery rollers engaged at the teeth of their peripheries and rotated through the wheel of a pulley 64.

One end of a bundle of the fibres obtained by opening said network fibres is inserted between said rollers 53 and 54 and a rotating drum 56 having knives 55 attached at its periphery at certain intervals is moved in conjunction with said rollers by gears 57, 58 and 60, thus delivering out said fibres slowly by the rollers 53 and 54 and stroking them pressingly against the curved face of a plate 61 with the blunt edges of the knives 55 of the rotating drum 56. The fibres, as they are stroked, have the stroked part elongated, while the part in contact with the back of the blade is compressed and expanded, so that the glutinous matter is destroyed and consequently the fibres are separated automati-

cally or given the condition easy to separate. In this way, the fibres are moved forward and stroked repeatedly by the knives, so that the glutinous matter is not only removed, but also the knots of the fibres are taken away simultaneously. Thus, after all the parts of the fibres except those held by the rollers are stroked, reverse their direction and stroke them as before, and then the knots at their heads, etc. will be all removed to make them slender from end to end. Therefore, they can be separated completely without being spoiled as when treated with a chemical. On this occasion, the rotating drum 56 is shifted forward and backward by the rotation of the handle 62 and the space between the rollers 53 and 54 is regulated by the handle 63.

Lastly, the thus-treated fibres are rendered waterproof by treatment with a fixing agent such as formalin or chromium chloride. In this way, it is possible to obtain fibres, each several to 40 centimeters in length, a few to 30 M (Micron) in diameter with the extensibility 18, the strength 1 denier, the converted value 4 grams and an irregular section with air gaps and fit for the preservation of warmth.

The thus-produced fibres can be spun in a wet or dry condition in the same manner as the known ramir, flux, silk and wool.

According to the present invention, it is possible to obtain the wool-like fibre more tenacious than or as mollient as the silk and suitable as spinning fibre by treating the collagen of the fatty layers of the whale and shark, the tendon of the whale, shark, cattle, etc. or the residue of the tissues surrounding the sperm head oil of the sperm whale some of which have hitherto been considered useless and thus removing the trouble caused to them chemically and mechanically.

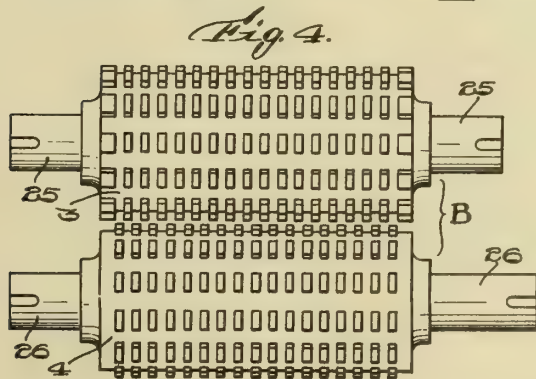
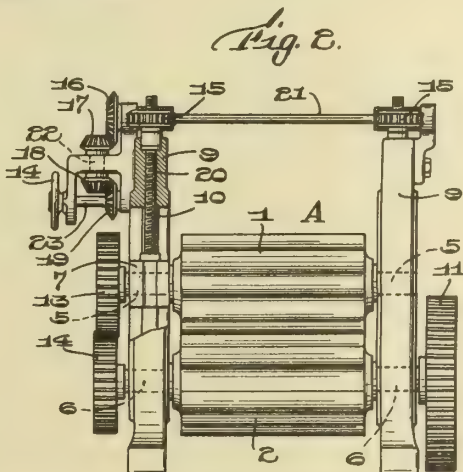
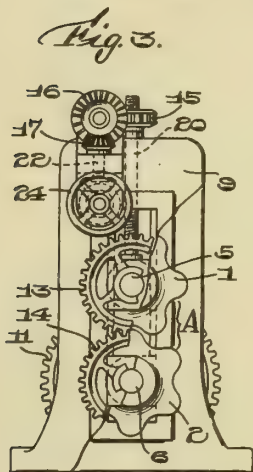
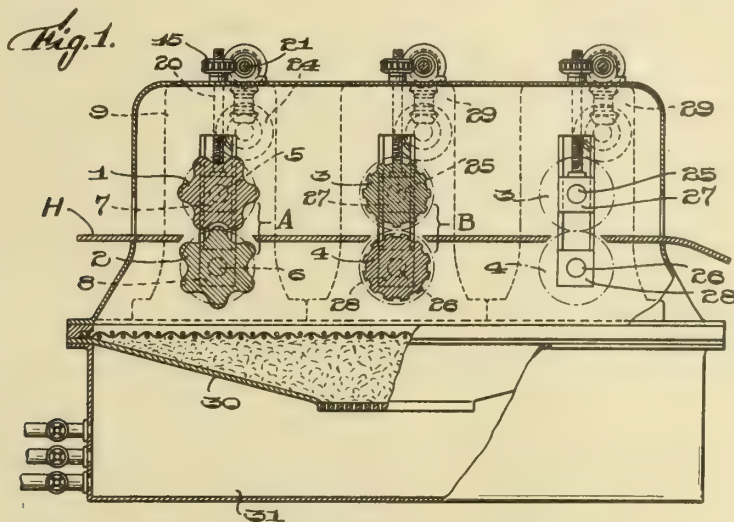
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PUBLISHED
APRIL 27, 1943.
BY A. P. C.

Y. ISHIDA
METHOD OF MANUFACTURING WOOL OR SILK-LIKE
FIBRES FROM THE COLLAGEN SUCH AS FATTY
LAYERS, TENDONS, ETC. OF ANIMALS
Filed Oct. 23, 1940

Serial No.
362,480

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

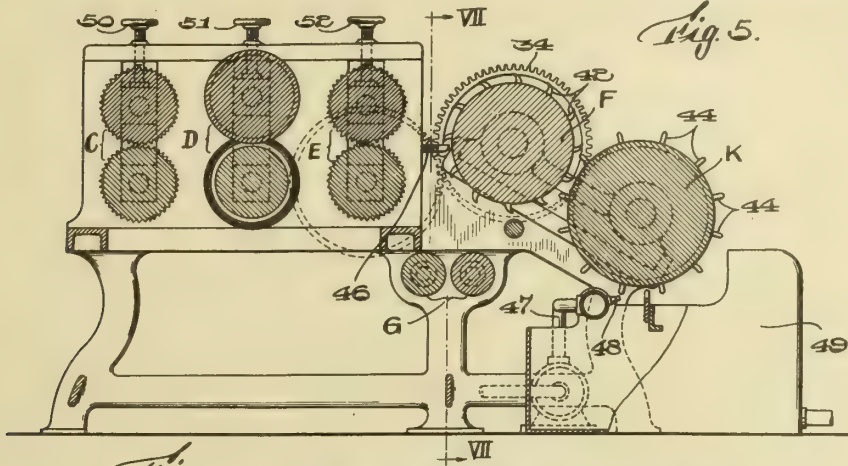


Fig. 6.

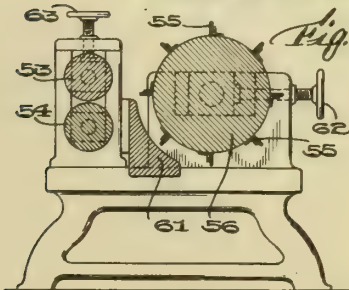
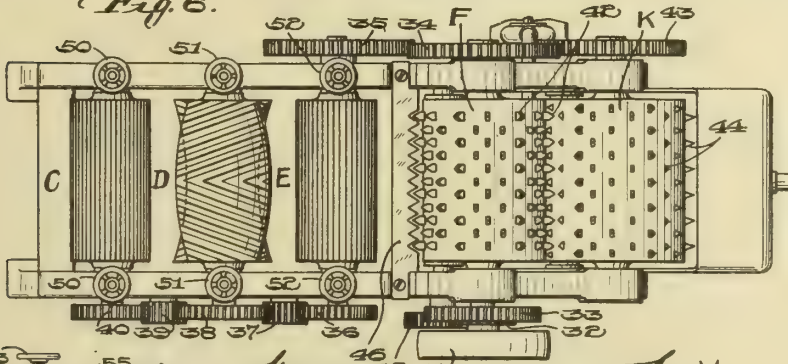


Fig. 8.

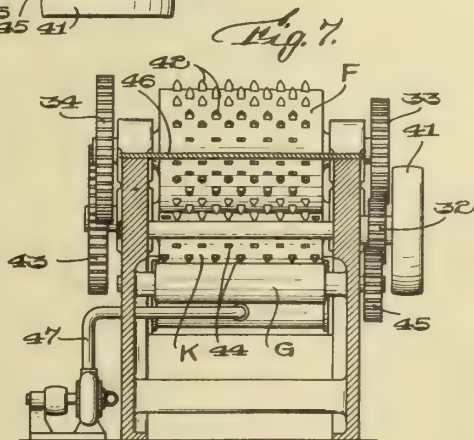


Fig. 7.

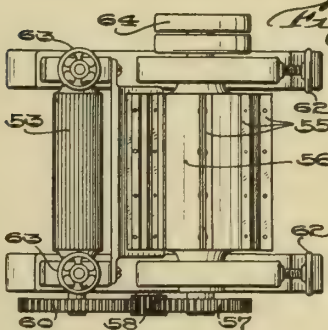
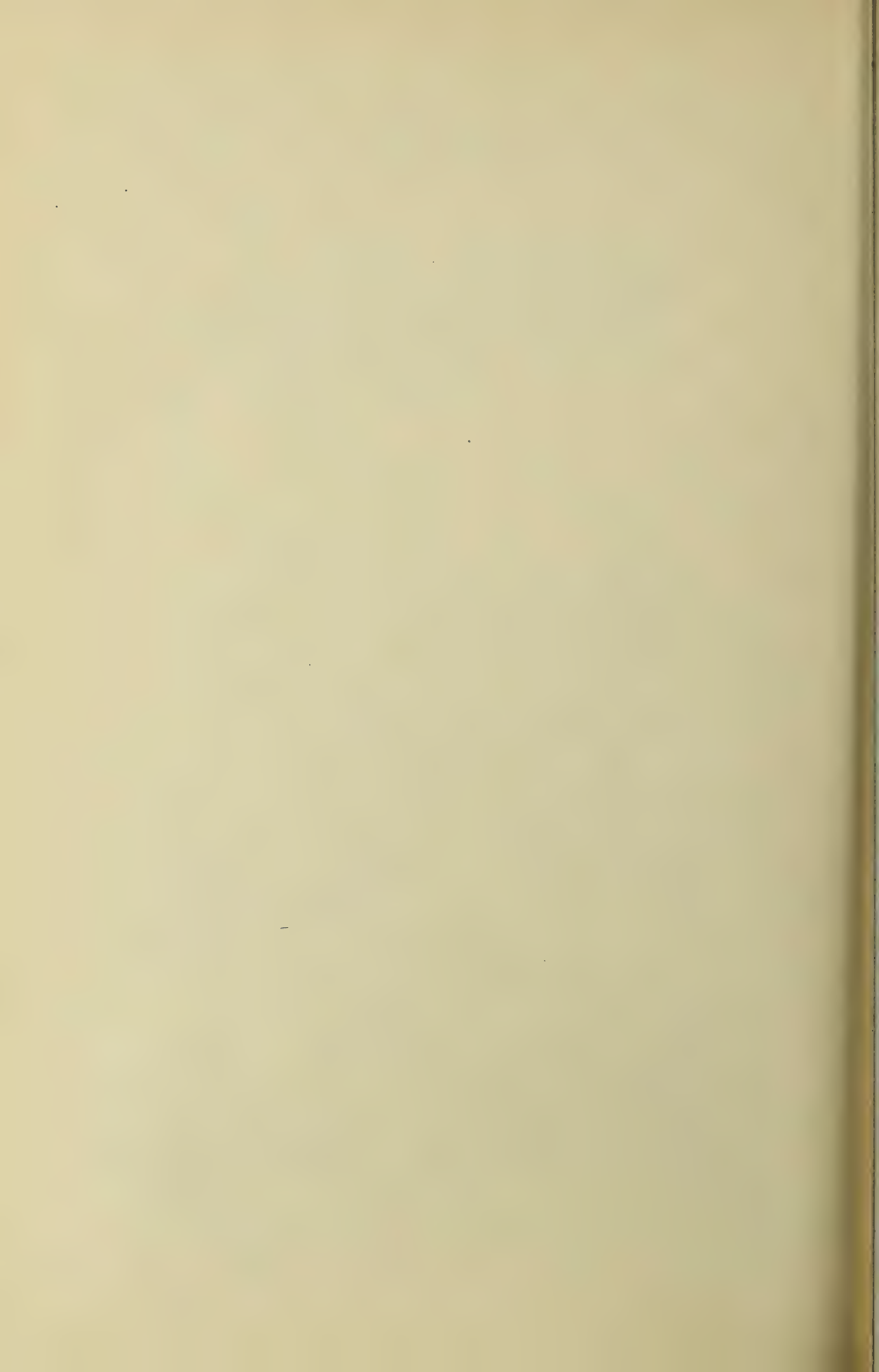


Fig. 9.

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ALIEN PROPERTY CUSTODIAN

METHOD FOR THE PRODUCTION OF A FIRE LIGHTING MEANS AND FIRE LIGHTING MATERIAL MADE ACCORDING TO THIS METHOD

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No Drawing. Application filed October 24, 1940

At the slow burning of brown coal, a slowly burning coke, so-called Grude-coke is obtained. The normal Grude-coke shows a comparatively slow lighting speed, so that for the lighting of a Grude fire more easily combustible materials, for instance firewood, are necessary as lighting means. This low lighting speed of the normal coke obtained by slow burning is based chiefly on the high density of its surface, which in turn is due to a coking of the not evaporised bitumen constituent which is sweated out at the slow burning, whereby the surface of the coke is coated with a more or less thick layer of graphite. The percentage of ashes and the composition of the ashes influence in second instance the lighting speed of the slowly burning coke and this in the sense that, when the percentage of ashes decreases and the percentage of the ashes in metal oxides or suboxides increases, the lighting speed is improved.

Surprisingly it has been ascertained, that a slowly burning coke having high lighting speed and which is especially useful for lighting fires and therefore forms an excellent fire lighter is obtained, if brown coal is coked which from the point of view of the proportion of yield in tar to the quantity of heating means for coking is not considered as worthy of coking, that is a brown coal which contains little bitumen and which at the examination as regards slow coking capability according to Fischer yields less than about 10% of slowly burning tar.

Insofar as the brown coal, lumpy by nature, that is cartilagenous brown coal, yields a core of slowly burning coke which is not sufficiently proof against rubbing, the brown coal may be briquetted prior to the smouldering and used in this form.

At the slow burning the temperature can be raised as at the normal smouldering of brown coal up to an extreme temperature of about 570° C. According to the constitution of the initial coal it may be sometimes especially advisable to not completely distil the brown coal but to carry out the distillation only incompletely. For this reason it is advisable to interrupt the coking process already at temperatures below 500° C, preferably at temperatures from 450-470° C. The lighting speed of the slowly burning coke thus obtained is considerably increased as this coke then remains still more strongly porous on the surface.

Examples

1. Brown coal poor in bitumen, which contains ash formers favorable for the obtention of espe-

cially rubbing-proof cartilage, such as alumina, in a quantity of about 15% and at the examination to coking capability according to Fischer yields about 5% of tar, is carefully dried preliminarily to approximately 5% water content at temperatures below 100° C for preserving the solidity of the cartilages and then in a slowly burning furnace slowly burnt up to a temperature of 570° C. The slowly burning coke coming from the furnace is cooled in the inert gas current or in a gas current poor in oxygen. The slowly burning coke which is thus obtained is so easily ignitable that it can be brought to glow heat by means of a match. Used as a fire lighter and lighted by means of paper it begins very rapidly to glow and ignites within a few minutes the added fuel, such as pit-coal, mine-coal or the like.

The lighting speed of this slowly burning coke can further be increased thereby that the cartilage coal is not completely coked but the coking interrupted at a temperature of 470° C.

2. Brown coal poor in bitumen, which at the examination as regards coking capability according to Fischer, related to dry coal, shows a figure from 6-7% tar yielding, for instance Rhenish brown coal from the Cologne rounding with a content of ashes of 6% and a sulphur content of 0.5%, is first dried until it is suitable for briquetting and then so finely ground that the brown coal dust can be driven through a sieve of about 81 meshes of cm². Then the thus prepared brown coal is briquetted, by means of a suitable ring rolling briquetting press arranged for high pressure work, to rods in length of 120 mm, 35 mm high and 25 mm diameter, very solid pieces of such density being produced that the briquettes in this state burn very badly. These briquettes are then slowly burnt in coking furnaces, which are operated by means of superheated flushing gases, up to a temperature of 580° C. The briquettes which have been slowly burnt are then removed from the furnace in avoiding admission of air and cooled. According to the raw material which has been selected, more or less solid slow burning briquettes are produced having a good lighting speed. For lighting ovens and the like in the household and in the industry these briquettes can be lighted quite as well as firewood and lighted with the aid of some paper or the like; the slowly burning coke pieces do not produce flames, but they become red-hot very rapidly and produce a very high degree of heat, and the added fuels, such as pit-coal and the like, are lighted in a very short time. These slowly burning briquettes are therefore suitable for

lighting fires in household and industry and can be substituted for other fire lighting means such as wood.

At the coking of brown coal no attention has been paid up to the present for economical reasons to the so-called fire-coals poor in bitumen, for the reason that these, from the standpoint of the yield of tar, are not to be considered as worthy for coking. The circumstance that such brown coals poor in bitumen of the kind to be employed according to the invention produce at the coking a porous slowly burning coke with an open structure surface free from graphite deposits, the lighting speed of this slowly burning coke being much higher than that of slowly burning coke from brown coal rich in bitumen, is more surprising compared herewith, as at the coking of a brown coal rich in bitumen, owing to the larger quantity of volatile product from coking which has escaped, the volume narrowing of the coked coal grain is greater and thereby also its structure is looser, and from this consideration it might be concluded that the residues from coking of raw materials poorer in bitumen ought to be accordingly less easy to light than the normal lumpy Grude coke.

Although the normal Grude coke seems to be loose in the structure, its structure is less favorable for the combustibility, as on the one hand, as already mentioned, by the decomposed bitumen the surface is more or less packed by graphitic deposits and on the other hand in the interior of the coke grain the capillary vessels larger as such are so jammed by setting of carbon which comes from the decomposition of the more easily boiling constituents of the bitumen, that the oxygen of the combustion air can penetrate only very badly. Compared herewith, the slowly burning coke, from raw materials to be employed according to the invention, is not only open on the structure surface but possesses also continuous open capillary vessels, so that the combustion air can penetrate from all sides through the coke grain into the core of the same. This special property of the coke, which is a condition for the lighting combustibility of the same and renders it capable to be employed as a good fire lighter, is

based thereon that the brown coal poor in bitumen has little or no easily boiling bitumen constituents, whereby at the coking in the interior of the coke core no carbon deposits from the dissociated, more easily boiling bitumen occur, and as the coking heat admitted is sufficient to very rapidly remove by evaporation the little bitumen separating out onto the surface, no graphitic deposits are formed on the surface, which deposits render more difficult the admission of air for combustion. In the commonly used coking coals considered to be worthy of coking and rich in bitumen a larger constituent of lighter boiling bitumen exists, at the decomposition of which in the heat carbon is deposited within the the capillaries of the slowly burning coke, whereas the heat for the slow burning is also not sufficient for rapidly evaporating the bitumen which has been forced to the surface, and as heretofore the material for coking must remain for a longer time in the coking zone, the bitumen is decomposed on the surface, whereby the graphitic coating on the slowly burning coke is produced, so that this coke becomes denser on the surface and can be lighted more difficultly. In order to still further prevent the decomposition of the bitumen on the surface at the production of the coke according to the invention, the coking is therefore stopped preferably, as already mentioned above, below a temperature of 500° C, whereby the slowly burning coke which is obtained remains even more porous and is still better suited for fire lighting purposes.

The special qualification of the products obtained according to the invention as fire lighter might therefore be due to the fact that, in opposition to the above mentioned expectations, the lumpy coke contains continuous capillary vessels as well, as it is open on the surface, and therefore on the whole has more fine pores than the normal slowly burning coke which has been produced from brown coal rich in bitumen. The slowly burning coke of the kind according to the invention is therefore much better accessible for the oxygen of the air for combustion than the normal slowly burning coke found on the market.

CARL SCHUNCK.

ALIEN PROPERTY CUSTODIAN

BINDERS FOR USE IN THE PRODUCTION OF
THREADS FROM GLASS FIBERS

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Düsseldorf-Gerresheim, Germany; vested in
the Alien Property Custodian

No Drawing. Application filed October 26, 1940

Numerous binders of various compositions exist for use in the production of threads from glass fibers. The binders used hitherto have several disadvantages. With the high drawing speeds applied in the modern production of glass fibers, the known binders are either unable to lubricate the fibers so as to provide for a proper sliding of the fibers at the point where they are grouped together, or they do not dry with sufficient quickness to avoid agglutination of the several layers of threads formed in the winding on drums or spools so that subsequent unwinding is rendered difficult or almost impossible. There do also exist binders which lubricate satisfactorily and dry quickly, but these binders are objectionable in electrical respect and must be washed out of fabrics made from glass threads treated with such binders.

The present invention relates to a binder for use in the production of threads from glass fibers which answers all requirements in as much as it is free from the drawbacks of the known binders.

The binder according to the invention consists

of a composition of vegetable or mineral oils and synthetic resins dissolved in the oils in a definite proportion of mixture. A composition of not less than 2% and not more than 15% of synthetic resins and not less than 85% and not more than 98% of vegetable or mineral oils yields a good and efficient binder. The contents of oil may be reduced by substituting part of the oil by a corresponding amount of one of the known solvents, such as carbon tetrachloride.

The new binder satisfactorily lubricates the fibres in a degree commensurate with the high drawing speed. At the point at which the individual fibers are grouped together it bonds the fibers to form a thread and dries so quickly that the thread in being wound on a drum or the like does not agglutinate with the lower layers of threads and can be readily unwound with a desired speed without entailing any disturbances.

The binder also answers the requirements in electrical respect and need not be washed out of the fabrics produced.

MICHAEL DE RUYTER.
GEORG NEEB.



ALIEN PROPERTY CUSTODIAN

PROCESS AND CONTRIVANCE TO SHARPEN RAZOR BLADES

Louis Stark, Vienna, Germany; vested in the
Alien Property Custodian

Application filed October 29, 1940

Here are known already several processes for the sharpening of razor blades. Thus, for instance, the blade is being moved to and fro in its cross direction. Another process provides for a grinding movement of the blade obliquely to its oblong direction.

With all these known sharpening processes, however, no irreproachable sharpening will be obtained, as with this manner of sharpening always some ridge will form itself.

The essence of the process according to the invention consists therein that the blade-sheet will with its edges be moved in an elliptical way. The movement, according to the invention, ensues in such a manner that the blade will in the oblong direction of the edges be moved longer than in the cross direction. By this manner an as much as possible long sharpening zone will be secured. It would self evidently also be conceivable that the sharpening cheeks may, facing the firmly standing blade, be moved in an elliptical way. Hereat the oblong axle of this elliptical way lies for the time being parallelly to the oblong axle of this blade-sheet.

In the sketch is schematically being shown, for example, a form of execution of a contrivance to convey through the process.

Fig. 1 (shows an oblong section and Fig. 2) a perspective view of the opened contrivance.

Fig. 3 (illustrates in view one part of the contrivance with another position of the blade and Fig. 4) a section along the line IV—IV of Fig. 3.

In the lower part 1 of a bin capable of being closed like a box, there is borne a cog-wheel transport 2, 3, by means of which the turning movement bestowed upon a handle 4 is quickly being transformed to an excenter 5.

The excenter 5 gropes into an elliptical out-heaving 6 of a cross-sledge 7, 8, slideably borne in the box, which, consequently, when one sets going the handle 4, will describe an elliptical way thus that the sledge will make in the oblong direction a greater movement (approximately 6 m/m) in its cross direction a smaller dislocation (approximately 4 m/m).

The blade-sheet 9 is firmly fitted upon the

sledge, for which purpose, correspondingly with the perforation in the blade, three small pivots are provided for, which are on their ends, standing out over the blade-sheet set upon them, fitted out with an inturned neck each, into which, after the blade was set on, a fixing bolt 11 is being shoved in, which will immovably hold fast the blade in its position upon the sledge.

In the lower part 11 of the box as well as in its upper part 12, sharpening bodies are inserted, which, according to the invention, are formed by a vaulting, consequently in their cross-section circular lamellas 13, which, in their entire length will correspond with the box. These lamellas sit upon the ends of springs 14, which with their middle part for the time being fitted upon the bottom of the box, respectively of its cover. The lamellas are, consequently, elastic parallelly to one another and, when the box will be closed, adhere together.

The radius of the vaulting of these sharpening planes 13, is being kept smaller than that radius, which corresponds with the increasing sharpening of the blade-edges, whereby a fine concave sharpening will be attained.

When being used, the inset blade 9 will rest with its edges accurately between the both sharpening bodies so that, when the handle 4 will be set to work, it will with its edges quickly move to and fro between the sharpening bodies 13, and this in the oblong direction of the edges as well as in their cross direction.

As experiments have proved, a three- to four-times turning of the handle 4 will suffice in order to sharpen both edges without risking any formation of ridge.

It is a matter of self-understanding that the sharpening plane may instead, as illustrated in the sketch, of metal, be also manufactured of any suitable material, such as leather, wood, stone, or any other one, and may exchangeably be fitted on elastic supporters.

Instead of manually, the impulse of the contrivance may be ensued also by a clock-work, an electro-motor or any other device.

LOUIS STARK.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

L. STARK
DEVICE FOR SHARPENING RAZOR BLADES
Filed Oct. 29, 1940

Serial No.
363,377

Fig. 1

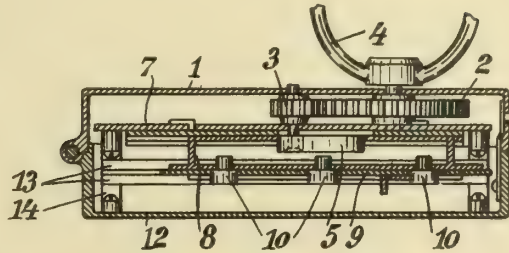


Fig. 2

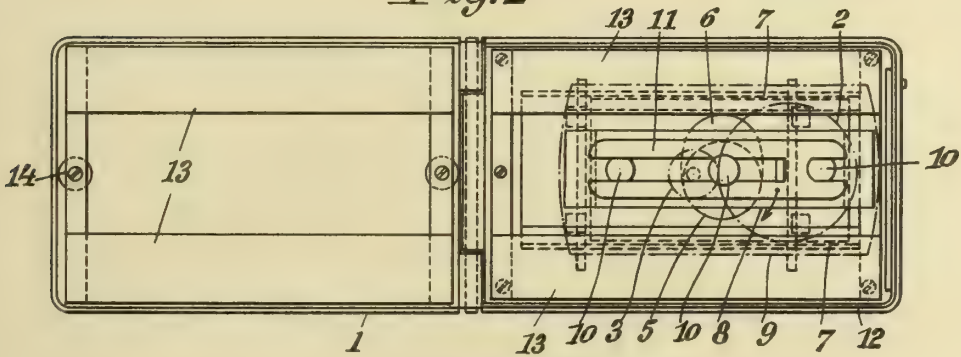


Fig. 4

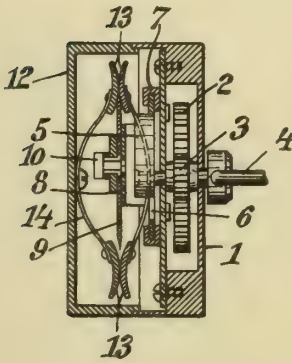
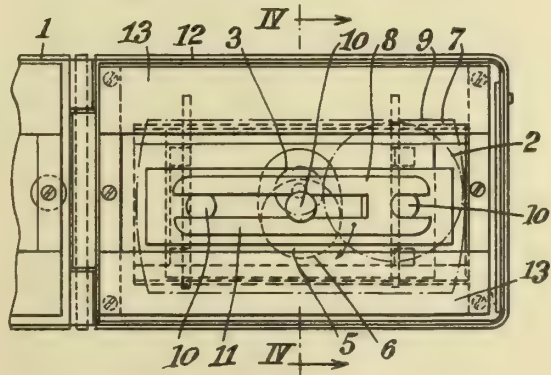
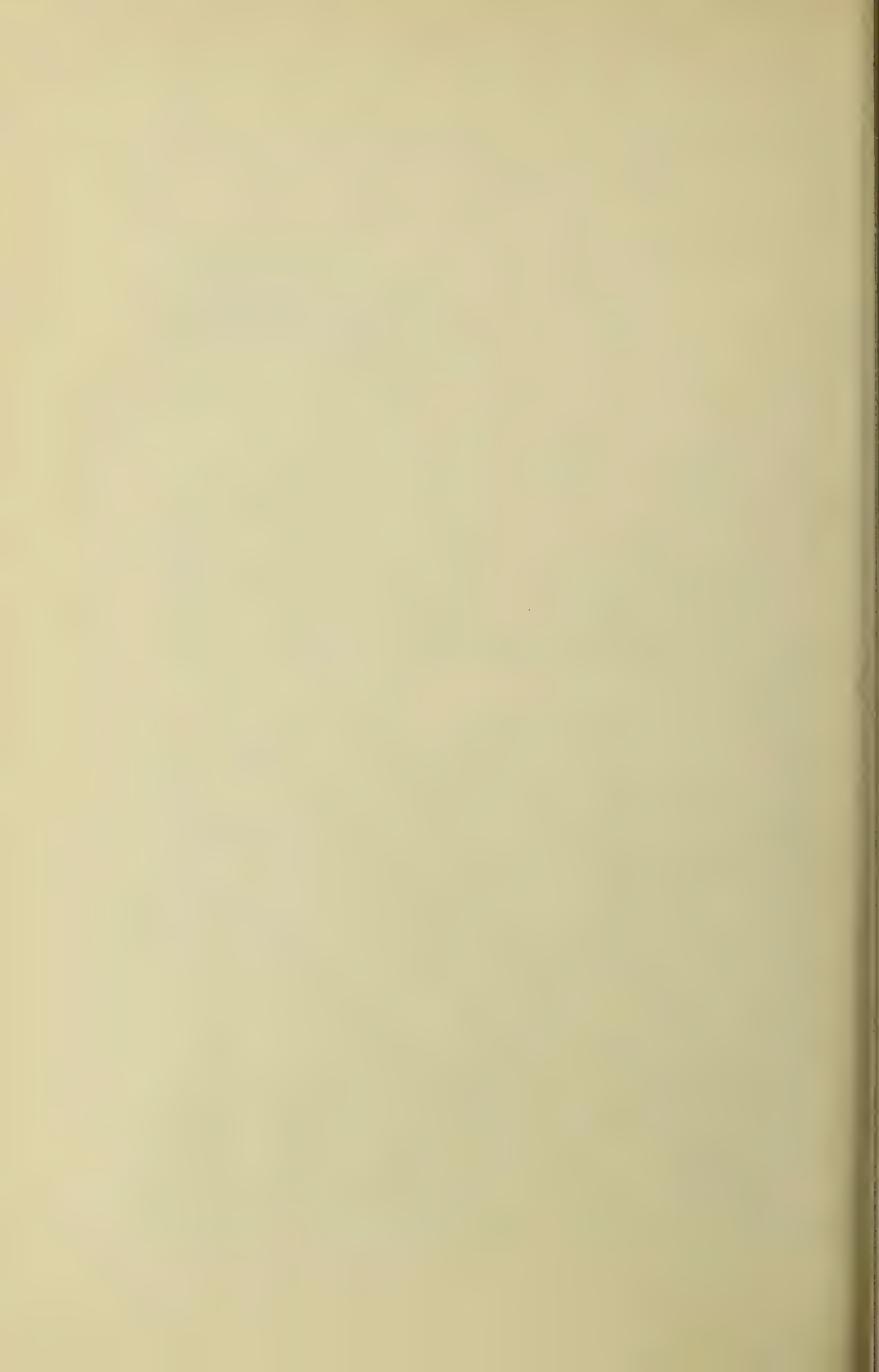


Fig. 3



Inventor,
L. Stark

By: Glascock Downing & Seabold
Attys.



ALIEN PROPERTY CUSTODIAN

MULTISTAGE LONGITUDINAL COVERING MACHINE

Rudolf Arnold, Berlin-Charlottenburg, and Max Wesenfeld, Berlin-Spandau, Germany; vested in the Alien Property Custodian

Application filed November 1, 1940

This invention relates to a multistage longitudinal covering machine.

For the insulation of electric conductors with rubber or rubber-like materials and for the production of coverings of insulated electric conductors of such materials the longitudinal covering method is employed to a large extent. This method consists in the fact that the wires or conductors to be covered are arranged between two bands of the insulating material and are caused to pass through a pair of grooved rolls which are provided with grooves in such a manner that the insulating material is pressed by the rolls around the wire or the conductor and cut at the sides. Generally the rolls are provided with a number of grooves, i. e., the covering may be applied simultaneously to a plurality of wires or leads running parallel to one another.

The invention relates to such longitudinal covering machines which are designed with several stages, i. e., have two or more series connected pairs of grooved rolls for the purpose of arranging several coverings one upon the other. The usual multistage longitudinal covering machines are provided with a common drive for all pairs of rolls. This has several great disadvantages. Firstly, all pairs of rolls have to run simultaneously even if not all stages are required, i. e., a covering or insulation should be produced with fewer layers than may be produced by the machine. Above all it is necessary that all pairs of rolls are running with exactly the same peripheral speed in order to attain a proper insulation or covering. For this purpose all grooved rolls must have exactly the same diameter which cannot be very well realized for the reason that naturally the pairs of rolls of the various stages must have different profiles in view of the different diameters of the passing covered leads. The rolls are, however, also subject to a certain wear in operation and have therefore to be subsequently machined from time to time. In such a case all pairs of rolls must be ground to exactly the same diameter even if the wear of only one pair of rolls has exceeded the permissible amount. These disadvantages will be avoided according to the invention.

The invention consists in the fact that in multistage longitudinal covering machines each pair of grooved rolls has its own driving motor with a controllable speed and that control devices are provided for the automatic adjustment of the same peripheral speeds of the rolls.

It is hereby realized that the individual stages of the longitudinal covering machine are perfectly independent of each other so that differences in

diameter of the individual pairs of rolls cannot exercise any disturbing influence, since the same peripheral speed of the individual stages is obtained by the control of the speed of the individual driving motors.

Besides it is possible according to the invention not to mount the individual stages of the whole machine in a common frame but to provide a bearing block for each stage so that the individual stages form self-contained units. In this manner the machine can be easily adapted to the available space and, furthermore, the number of stages may be at any time increased or decreased.

An embodiment of a three-stage longitudinal covering machine is shown in the accompanying drawing by way of example. Each of the grooved rolls 11, 21 and 31 of the individual stages 1, 2, 3 is provided with a driving motor 12, 22 and 32 which drive the rolls through attached gears and chain drives 14, 14, 34 and is mounted in a bearing block 19, 29 and 39 respectively. The wires or conductors 10 to be covered are supplied to the grooved rolls of the first stage simultaneously with the rubber bands 17 and 18 unrolling from the supply coils 15 and 16 and leave the grooved rolls provided with a covering consisting of one layer formed of these rubber bands 17 and 18. Thereafter they are supplied to stage 2 where the second layer of the covering is formed of the bands 27 and 28 coming from the coils 25 and 26, whereupon the third insulating layer is applied in the same manner in stage 3.

Each of the driving motors 12, 22, 32 can be individually controlled so that differences in the diameters of the individual pairs of rolls are equalized and the peripheral speed of all pairs of rolls is maintained at the same height. Under circumstances, it might be even preferable to cause the pairs of rolls of the individual stages to run with a peripheral speed increasing to a low value so that a certain lengthening of the insulating material is brought about and an improvement of the mechanical properties of certain materials may be attained. The motors may be controlled, for instance, either in dependency upon the peripheral speed of the rolls directly or the interior stress of the wires or conductors between the individual stages. To this end, known devices may be employed, for instance, small equalizing rolls 13 and 23, over which the conductors are guided and which cause an adjustment of the driving motors according to the degree of their deflection.

Besides the individual control it is advisable to provide the possibility of a common control of

all driving motors in order to be able to adapt in a simple manner the operating speed to the prevailing conditions, particularly to the properties of the materials to be used.

In order to obtain a simultaneous starting and stopping of all pairs of rolls and to avoid unnecessary waste at the beginning and the end of the operation it is advisable to instal for each driving

motor slow-acting relays and brakes acting when the machine is started or stopped, which relays and brakes are exactly adjustable and by which the same starting and stopping times of all motors
5 may be attained.

RUDOLF ARNOLD.
MAX WESENFELD.

PUBLISHED

APRIL 27, 1943.

BY A. P. C.

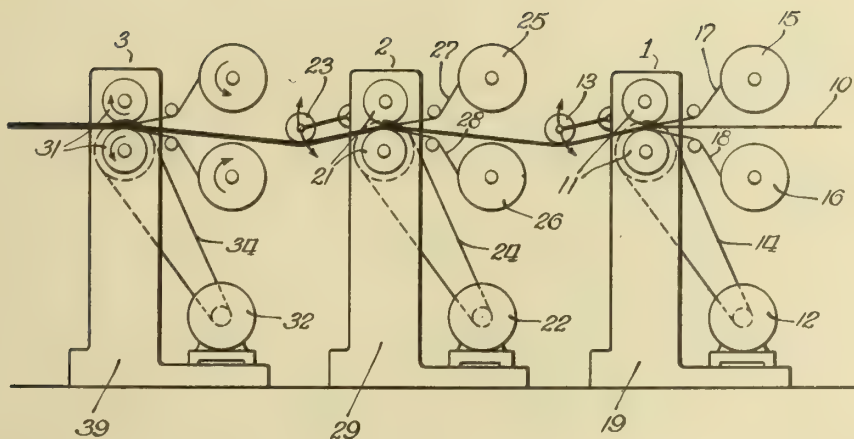
R. ARNOLD ET AL

MULTISTAGE LONGITUDINAL COVERING MACHINE

Filed Nov. 1, 1940

Serial No.

363,920



INVENTORS:
Rudolf Arnold
Max Wesenfeld
BY *Richardson and Auer*
Attys.



ALIEN PROPERTY CUSTODIAN

TREATMENT OF ACID SLUDGE

Carl Zerbe, Hamburg, Germany; vested in the
Alien Property Custodian

No Drawing. Application filed November 4, 1940

This invention relates to certain improvements in the manufacture of a heating fuel from acid sludge which is formed in the refining of mineral oils, tars, benzene or benzol and similar distillation or residue products by sulphuric acid monohydrate or fuming sulphuric acid.

It is an object of my present invention to produce from waste acids, formed by the refining of petroleum products and usually referred to as "acid sludge," a fuel which can be burnt through nozzles.

Another object of my invention is to govern the viscosity of the acid sludge and to prevent undesirable increase of the viscosity on storing or heating the acid sludge.

Still another object of the invention is to eliminate as much as possible any decomposition of the acid sludge by heating and to prevent attacks on the brickwork of the furnace as the acid sludge is burnt.

The by-product obtained by refining mineral oils besides polymerisation, oxidation and sulphurisation products constituting organic compounds contains also larger or smaller proportions of free concentrated sulphuric acid which have not been used up in the refining operation. This acid on extended storage acts upon the organic products, whereby the viscosity is strongly increased as a result of decomposition. Owing to its contents of highly concentrated acid the acid sludge cannot be heated for facilitating the re-pumping, since the decomposition phenomena in this case are particularly heavy. At the elevated temperatures required for the re-pumping owing to the viscosity of the acid sludge, coke-like separations may easily occur in the pipes and in the pump.

It already has been proposed to use the waste acids as a fuel. To this end, the acid sludge has been mixed under action of heat with a relatively large quantity of a normal fuel oil, soda or lime being admixed, for example, in a proportion insufficient for neutralizing the available acid.

I have now found that acid sludge can be readily and cheaply converted into a fuel which is combustible through nozzles, by adding to the acid sludge relatively small proportions of water. If desired, a hydrocarbon oil may be admixed to waste acids of high viscosity, for governing the viscosity. The process is particularly suitable for the treatment of acid sludges occurring in the refinement of hydrocarbon oils by sulphuric acid monohydrate, but it is also readily applicable to products obtained by the refining with fuming

5 sulphuric acid, provided that the content of free acid is not so high as to render the products incombustible. In general, waste acids having a content of free acid of less than about 40 percent may be treated.

The amount of water to be admixed is relatively small, since it is sufficient to reduce the concentration of the acid in the acid sludge by about 20 to 30 percent. In general, quantities of 10 water not exceeding 10 percent of the acid sludge are sufficient to reach this end. Anyhow, the admixed quantity of water by no means should be as high as to form two layers in the acid sludge. In other words, in my novel process no 15 layer containing dilute acid is separated from the organic products. The admixed water rather is intimately mixed with the waste acids, forming a stable emulsion or colloidal solution therewith.

20 A special advantage of my novel process consists in the fact that no ash-forming constituents are added to the acid sludge. Admixtures of soda and the like serving as a neutralizing agent would entail the disadvantage that the alkaline substances on combustion of the fuel would react with the masonry of the furnace.

Moreover, a high ash content of the fuel oil would cause obstruction or incrustation in the tubes and in the channels of the boilers.

30 I wish it to be understood that while in the preferred form of my invention the acid sludge is diluted merely with water, for reducing the strength of the sulphuric acid, my invention also comprises modifications in which, together with, or besides, the water, agents are added to the acid sludge which do not increase the ash contents of the fuel. Such substances may be, e.g., ammonia or organic bases.

Where reduction of the viscosity of the waste acids is required, suitable hydrocarbon oils, 40 having a lower viscosity than the acid sludge may also be added to the acid sludge. Such oil admixtures are either intended to dissolve the waste acids or, by slight mixing, to form stable emulsion therewith. Suitable oil admixtures are, for instance, extracts produced from mineral oils by means of solvents which are selective with respect to aromatic and naphthenic hydrocarbons, as for instance, liquid SO₂, furfural, or the oils of medium viscosity occurring by the blowing of bitumen.

The following table stating the temporal change of the viscosity of acid sludge with and without admixtures of water will show the favourable effect of small admixtures of water and 55

the fact that even by small proportions of water the free sulphuric acid not only is deprived of any further capability of reacting with the waste acid, but the viscosity of the waste acid is even reduced on prolonged heating. The solvent has been an extract obtained by extraction of mineral oils with liquid sulphuric dioxide.

Heating of waste acid with and without additions of water and solvent. Initial material:

Acid sludge from the refining of machinery oil with sulphuric acid monohydrate. Solvent: SO₂-extract E°3 at 100° C.

| Test No. | Acid sludge from— | Solvent percent by weight | Water percent by weight of acid sludge used | Flowing-out time ¹ in seconds after storage at 80° C. hours | | | |
|----------|---------------------------|---------------------------|---------------------------------------------|------------------------------------------------------------------------|-----------|-----|-----|
| | | | | 0 | 16 | 40 | 112 |
| 1..... | Light machinery oil. | No-solvent. | No water.. | 200 | Thickened | | |
| 2..... | do..... | do..... | 10 percent.. | 26 | 15 | 16 | 18 |
| 3..... | do..... | 10..... | No water.. | 200 | Thickened | | |
| 4..... | do..... | 10..... | 10..... | 150 | 120 | 120 | 120 |
| 5..... | do..... | 40..... | 10..... | 27 | 27 | 34 | 33 |
| 6..... | Cylinder oil E°3 at 100°. | No-solvent. | No water.. | --- | Plastic | | |
| 7..... | do..... | 40..... | 20..... | 105 | 52 | 60 | 60 |

¹ The flowing-out time has been determined by means of a pipette in which 33 seconds at 100° C correspond to E° 14. (E°=degrees Engler.)

The following example of one mode of carrying my novel process into effect will illustrate the invention, but it is to be understood that the invention is not limited to the details set out in this example nor to a product having the specific properties recited.

500 kgs of acid sludge from the refining of heavy and light mineral oils (heavy spindle oil to cylinder oil E°4 at 100° C) having a content of free sulphuric acid of about 35 percent is intimately admixed with 50 kgs of water and 100 kgs of an extract obtained by refining mineral oils with liquid sulphur dioxide (viscosity E° 2.8 at 100° C).

The mixture even after heating at 70 to 80° C for several days did not practically show any increase of its viscosity, it can be readily conveyed through pumps and pipes, without forming residues, and can be burnt through nozzles without formation of residues and with full utilization of its calorific value.

It is desirable to use the acid sludge immediately after its formation, so as to avoid thickening which of course takes place also if the acid sludge is in contact with the free sulphuric acid at room temperature for a long time. It is also possible, however, to use acid sludges which have been stored for a longer time and thus already have been somewhat thickened; it is merely required in this case that the amount of oil added for dilution is rated accordingly.

The method of the present invention has been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described.

CARL ZERBE.

ALIEN PROPERTY CUSTODIAN

PROCESS OF DECREASING THE SENSITIVE- NESS TO WATER OF FORMED MATERIALS FROM INTERPOLYAMIDES

Paul Möller, Dessau, and Gustav Wilmanns,
Wolfen, Germany; vested in the Alien Property
Custodian

No Drawing. Application filed November 5, 1940

Our instant invention relates to the decreasing of the sensitiveness to water of formed materials from interpolyamides, and more particularly to a new process of decreasing the sensitiveness to water of films, foils, fibers, and threads derived from interpolyamides.

It is known to form interpolyamides, for instance such as are prepared from hexamethylenediamine adipate and ϵ -aminocapro lactam from mixtures of solvents into films or foils. It has already been proposed to use as the solvents alcohols with an addition of water, chloroalcohols, and mixtures of solvents containing such alcohols. The films are formed by casting the mass of interpolyamide on machines generally used in the manufacture of film and subsequently dried in the usual manner. A film of this kind produced from interpolyamides soluble in alcohols, however, is not resistant to boiling water but it becomes soft, hence loses its original shape, greatly creases, and becomes adhesive.

Our instant invention has for an object to provide a process of producing a film resistant to boiling water.

A further object of the invention is the provision of a process of producing a film resistant to boiling water by subjecting the foils already dried to an after-heating advantageously at above 120° C.

Other objects will be apparent from the detailed specification following hereinafter.

The duration of the heating depends upon the temperature and amounts to about 30 minutes at about 160° C and to one to several hours at a temperature lower than 160° C.

After the heating carried through in accordance with our invention is finished the foils are resistant to water of 100° C, crease no longer and are also non-adhesive. The foil retains this property even after it has again absorbed a certain amount of water from the moist air. In our opinion the disclosed process, therefore, is not a simple drying procedure but it probably effects a change of structure of the foil. The foil seems to have got a horny surface.

Films which have been rendered resistant to boiling water according to our invention are especially suitable to be substituted for foils of cellulosehydrate owing to their good mechanical properties. Moreover, the high extensibility and the great resistance to tearing make the films useful as packing material, for instance for foodstuffs, as substitute of guts or the like. The foils can furthermore be employed as protective layers against the influence of the weather if desired

coated or impregnated with other materials as just the high resistance to creasing together with the strength and the good extensibility produce a favorable effect. By drawing the films advantageously warmed in one or both directions the degree of the resistance is essentially increased without perceptibly influencing the extensibility. This drawing can be carried out before as well as after the heating treatment.

The films may also be subjected to a tanning or hardening treatment as described in the U.S. application corresponding with the German application 165,767 IVc/8k before or after the heating. An additional effect is obtained as to the strength and resistance for instance to steam of the surface of the film.

Where desirable the improved polyamides when applied to any of the above uses may be admixed with plasticizers, pigments, dyes, filling materials or the like without losing their good properties.

In place of using the polyamides above mentioned many other mixed condensates may be worked up into films and after-treated according to our invention, especially alcohol-soluble interpolymers derived from at least four polyamide-forming reactants and in which at least two dicarboxylic acids are condensed with at least two diamines, for instance the polyamide from hexamethylenediamine sebacate and pentamethylenediamine adipate.

The following examples serve to illustrate our invention but they are not intended to limit it thereto.

Example I

A 60 μ thick film of the mixed condensate from 60 parts of hexamethylenediamine adipate and 40 parts of ϵ -aminocapro lactam is formed by casting a solution in methanol-water 9:1 of containing 20 per cent of the condensate and subsequently drying the film at 80° C. The practically dry film is then subjected to a further heating treatment:

(a) The film is heated at 140° C for three hours. Owing to this procedure the film is light yellow colored and feels parchmentlike whereas it has shown a soft feel before the treatment. The film when immersed in boiling water remains unconverted.

(b) The film is heated at 160° C for thirty minutes. The properties of the film thus treated are similar to those described in Example Ia; the film is, however, colored rather stronger than in the above example.

(c) The film is heated at 125° C for six hours.

The surface of the film is moderately hardened and colorless as before the treatment.

Example II

A 30 μ thick film prepared from an interpoly-
amide which is produced from equally great parts
of hexamethylenediamine adipate and ϵ -amino-
caprolactam is formed by casting. A mixture of
ethylenechlorohydrin, methanol, and water

80:15:5 serves as a solvent. After the film has
been dried at 70° C, it is subjected to a heating
treatment at 122° C for 8 hours. The film thus
obtained becomes only slightly soft in boiling
water whereas the film not after-treated imme-
diately melts in the water.

PAUL MÖLLER.
GUSTAV WILMANN.

ALIEN PROPERTY CUSTODIAN

LONG-FIBER LIGHT-WEIGHT TIMBER

Pier Carlo Ricchiardi and Enzo Zillo, Paris,
France; vested in the Alien Property Custodian

No Drawing. Application filed November 5, 1940

The trunk of euphorbia candelabrum and other plants of the genus euphorbiaceae could not be utilised to date as timber on account of the fact that soon after the trees are cut, their woody portion decays into a decomposed useless mass. Chemical treatments have been resorted to in an attempt to make the wood of euphorbia candelabrum durable, but without success, so that it has not been possible to utilise this tree which abounds in the territories situated at altitudes between 1000 and 2000 meters on the sea level in all tropical and sub-tropical regions of Africa and America.

The object of this invention is to provide a novel industrial product consisting of the woody portion of the trunk of euphorbia candelabrum and similar plants of the genus euphorbiaceae rendered perfectly and unlimitedly durable and a process for obtaining same. The timber obtained possesses peculiar properties which are not inherent to any other wood, viz. a specific gravity of about 0.32, water-proofness, elasticity and indeformability at the different temperatures; moreover, it is highly harmonic, unattacked by wood-worms, termites and other insects.

The process conferring to the wood the above valuable properties consists in subjecting the trunk of euphorbia candelabrum or similar plant of the genus euphorbiaceae within a few days after it has been cut, to a mechanical treatment for the total removal of the pith contained in its

centre and of the bark. It is essential to remove all of the pith from the trunk, as even a small quantity of the pithy substance remaining in the centre of the trunk would lead to a rapid alteration and decomposition of the wood.

As the pith is a gelatinous substance and the central duct is of a width of about seven centimeters and of a star-shaped or square section, the thorough removal of the pith is commercially carried out conveniently by means of a brush, which separates the pith from every recess of the central bore and brings it to the outside, while any pith residue, which might injuriously affect durability if left in the wood, is conveniently removed by means of a jet of compressed air.

The bark is then stripped from the trunk and this is allowed to season in order to eliminate the moisture contained therein, whereupon the wood is for the first time ready for commercial use; the timber lends itself to a great variety of uses on account of its valuable properties.

The juice yielded by the trunk as it is being stripped of the bark, which contains a number of useful products, chiefly creosotes, resins, formalin, isoprene and oils, is a useful by-product of the process, that may be profitably utilised for commercial purposes.

PIER CARLO RICCHIARDI.
ENZO ZILLO.

ALIEN PROPERTY CUSTODIAN

PROCESS FOR EXTRACTING POTASSIUM AND ALUMINIUM FROM A MIXTURE OF POTASSIUM AND ALUMINIUM SILICATES

Gerlando Marullo, Milan, Italy; vested in the
Alien Property Custodian

No Drawing. Application filed November 12, 1940

One of the methods proposed for extracting potassium and aluminium from leucites and similar minerals, comprises subjecting the mineral to dry treatment at a temperature from 1200° C to 1600° C in the presence of limestone or other calcium salts: the double silicate is thus decomposed giving a mixture of insoluble calcium silicate and of soluble potassium aluminate, which may be separated by lixiviation.

This process shows however a considerable drawback, as a good deal of potassium is lost by volatilisation during the thermal treatment, so that rather low yields are obtained. It has been tried to recover the potassium volatilised, and also to reduce the temperature necessary to decompose the double silicate (e.g. by subjecting the mineral to forced grinding), but all these steps have been without success. Some advantage has been obtained by subjecting the mixture to thermal treatment in form of cakes prepared by dry compression, but also in this case the losses are still rather high.

I have now found that the losses mentioned above are due to the fact that the amount of alumina set free during the decomposition of

double silicate is not sufficient to bind potassium to form the correspondant aluminate. Consequently I have found that it is possible to reduce these losses to a considerable extent by adding to the mixture a certain amount of bauxite or other ores containing alumina. In this way the mass receives the amount of alumina necessary to fix the potassium set free first during the decomposition of the double silicate and at the same time the alumina subsequently formed during decomposition is thus able to fix still further potassium.

It is preferable to mix the limestone and mineral after accurate grinding, adding to the mixture obtained about 5-10% bauxite, referred to leucite present, and dry-pressing the mass into cakes, baking these cakes at 1200-1300° C in furnaces of suitable design, preferably with outer walls heating in order to reduce the amount of combustion gases flowing over the cakes.

This process allows to reduce considerably the losses of potassium and to reach yields of the order of 90% and more.

GERLANDO MARULLO.

ALIEN PROPERTY CUSTODIAN

APPLIANCE FOR CATALYTIC REACTIONS

Carlo Picconi, Terni, Italy; vested in the Alien
Property Custodian

Application filed November 13, 1940

In all appliances now in use for catalytic reactions, such as, for instance, those used for the production of ammonia, of methanol and the like, are important the thermic exchanges which occur through metallic surfaces, for which usually different arrangements are chosen according to the purpose to be attained. Of such surfaces one is especially important, namely the one that is intended to recover the quantity of heat required for the continuation of the reaction, which surface constitutes what is usually called "heat recuperator". The other surfaces are intended to distribute the heat or to render it uniform, or to subtract it from the catalysis chamber, according to the kind of reaction and to the type of appliance used.

Such appliances are provided in different arrangements in the industrial processes now in use. They may, however, be essentially reduced to the three following kinds:

(a) catalysis chamber and heat recuperator of the nest of tubes type, said chamber and recuperator being located in two separate casings;

(b) catalysis chamber and heat recuperator, of the nest of tubes type, arranged the one over the other within a unique casing;

(c) catalysis chamber and heat recuperator, of the diaphragm type, arranged in concentric containers within a unique casing.

The present invention realizes a completely new arrangement. Within a unique casing is centrally arranged the catalysis chamber, and around it the nest of tubes constituting the heat exchanging elements of the recuperator.

In the annexed drawing which is given only as an example without limitation:

Fig. 1 is a longitudinal section of the apparatus according to the present invention;

Fig. 2 is a section according to the line M—N of fig. 1;

Fig. 3 is a section, according to two different longitudinal planes of a second form of embodiment of the invention;

Fig. 4 is a section, according to two different longitudinal planes, of a third form of embodiment of the invention.

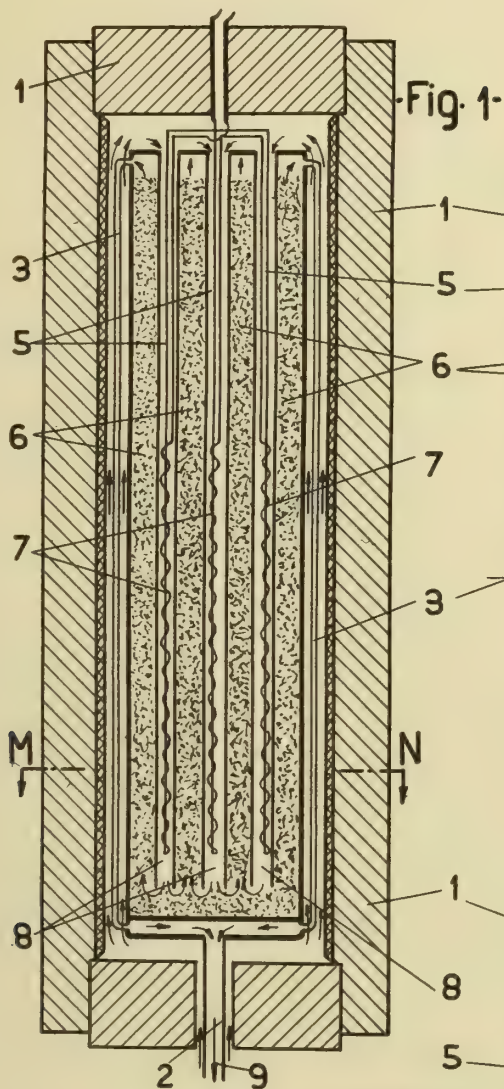
With reference to said drawing, the gases to be subjected to reaction are introduced into casing 1, through conduit 2, and come into contact with the external surface of the nest of tubes 3 constituting the heat exchanging elements of the re-

cuperator. The latter, towards the top of casing 1, leaves a free passage for the pre-heated gases to get into the heat balancing pipes 5. In these pipes 5, immersed in catalytic mass 6 and open at their lower end, are at the same time located electric resistances 7, which bring the gases to the temperature required in order to develop reaction in catalyser 6. The gases, passing through the lower openings 8 of pipes 5, circulate in upward direction in catalyser 6.

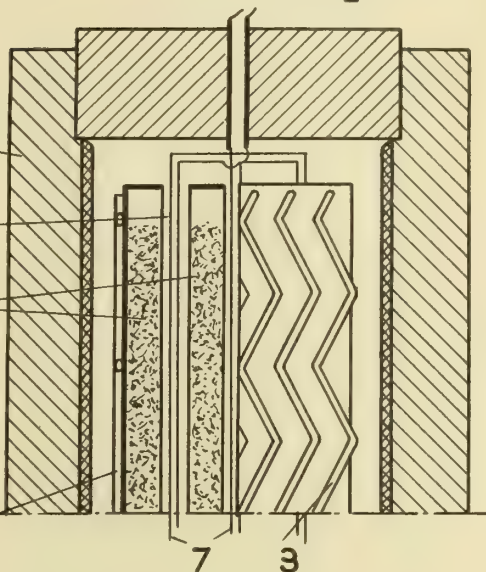
When the reaction has taken place, its products pass through the interior of tubes 3 giving up heat to the gases which, on entering the recuperator, flow along the outside of said tubes 3, and then, through conduit 9, come out of the casing. The particular features of the arrangement according to the invention consist essentially: (1) in the use of heat balancing tubes containing at the same time the necessary electric resistances to bring the pre-heated gases to the optimum temperature required to produce the reaction in the catalyser; (2) in the use of a nest of tubes 3, which form the heat exchanging elements of the recuperator, arranged in one or more layers according to the generating lines of the cylinder forming the catalysis chamber and all around it (see figures 1 and 2). In an alternate construction, illustrated in fig. 3, the said tubes 3, instead of being rectilinear, may have a winding course, and in the case of several superposed layers they may have their windings in directions opposite to one another. In fig. 4 is illustrated a third form of embodiment of the invention, in which, while a layer of tubes 3 of the recuperator is inclined in one direction in respect to the generating line of the cylinder forming the catalysis chamber, the layer superposed thereto has an opposed inclination, the windings of the single layers running all around the cylinder. The windings of the various layers, of course, instead of crossing one another, may be all in the same direction.

The arrangement provided according to this invention offers appreciable advantages, amongst which is the possibility of sizing better the various parts, of enlarging the catalysis chamber, of reducing the difficulties inherent to construction, and of securing a greater efficiency of the apparatus with an equal volume of the casing.

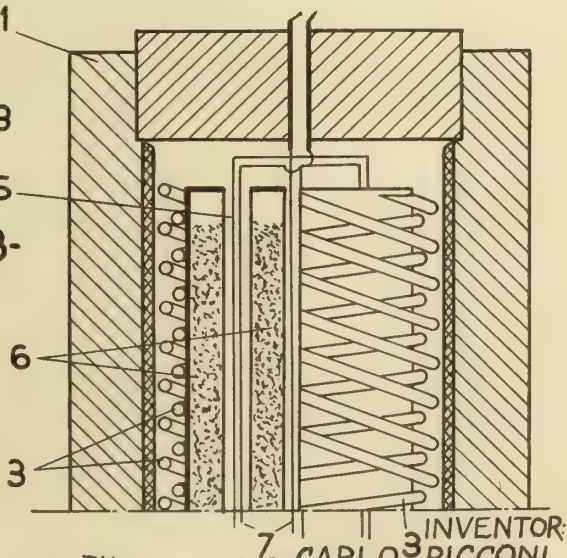
CARLO PICCONI.



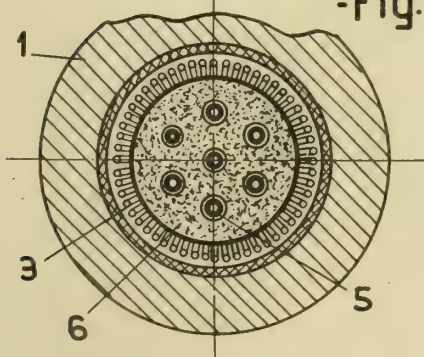
-Fig. 2-



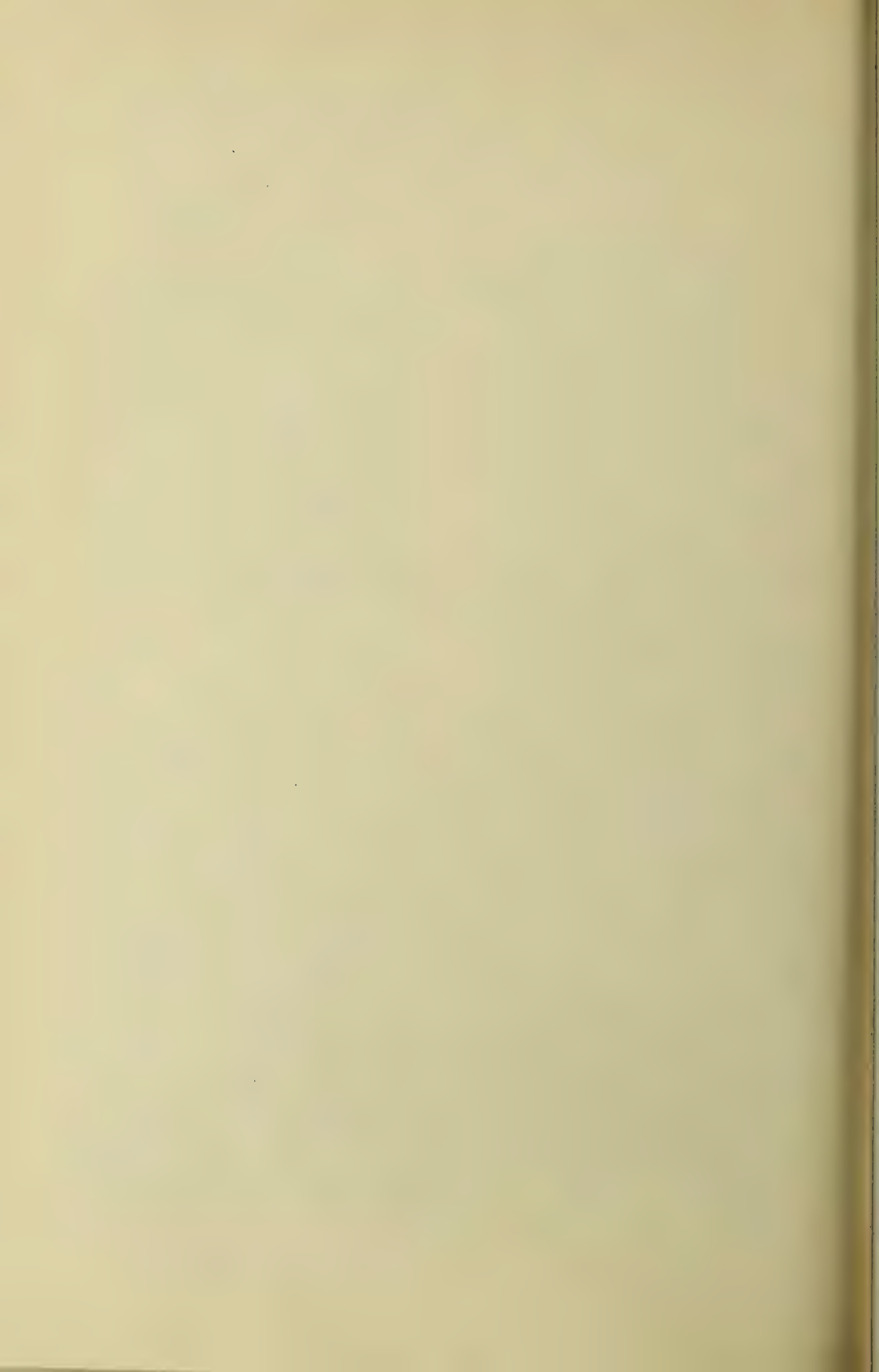
-Fig. 4-



-Fig. 3-



INVENTOR: CARLO PICCONI
BY Haseltine Lake & Co. ATTORNEYS



ALIEN PROPERTY CUSTODIAN

RUDDER MACHINE FOR AUTOMATIC PILOTS

Guido Wunsch, Bruno Weinkauff, Walter Sadowski and Herbert Kobischke, Berlin, Germany; vested in the Alien Property Custodian

Application filed November 20, 1940

This invention relates to automatic pilots of the hydraulic type, especially adapted for aircraft. More especially, the invention relates to an improvement whereby a motor driven pump unit is directly combined with and built as a part of both the relay valve and the servo motor itself so that no hydraulic piping need be employed outside of the unit, and a separate unit of identical type may be employed for each axis of the aircraft. It is preferred to employ as the pump a double acting gear pump of known design which simultaneously circulates fluid in opposite directions through two lines leading to the servo motor, in which the pressure is varied on the servo motor by differentially and practically continuously bypassing a variable portion of the fluid in the two lines. The bypass valves are preferably located within the collared shafts of the gear pump itself, whereby friction is reduced to a minimum. It is also proposed to eliminate backlash in the connections by employing wire links connected to the stems of the valves and adjustably connected to a rock shaft or lever which is controlled from the governing impulses from the position maintaining device, such as a directional gyroscope or artificial horizon.

Further improvements accomplished by the invention will be apparent from the following description and claims.

Referring to the drawings, illustrating one form the invention may assume,

Fig. 1 is a side elevation, partly in section, of our improved combined motor driven pump, relay valve and servo motor.

Fig. 2 is a horizontal section through the bottom of the case, showing the servo piston.

Fig. 3 is a sectional detail of one of the valves and wire stems therefor.

Fig. 4 is a section taken approximately on line 4—4 of Fig. 1, showing the manually controlled bypass valve.

Fig. 4A is a section taken along line 4a—4A of Fig. 1, showing the pump construction.

Fig. 5 is a sectional detail of an automatic bypass valve, permitting overcontrol.

Fig. 6 is a diagram illustrating the operation of the pump and circulating liquid.

The housing of the instrument is a casting preferably integral with the servo motor cylinder 12 and the crank housing 11. On top of the open part of the housing 11 the electric motor 13 is closely fitted, which has a flange which fits the ring-shaped extension of the housing 11 and is connected to the same by means of bolts 15.

An outer cover 16 may be fitted over the electric motor in order to protect it.

The housing is filled with oil to just below the pipe 19, the purpose of which will be explained hereinafter. The oil pump 18 is mounted on a machined surface 17 of the housing 11 by means of a spacer 19. The control of the pump is effected by a differential pressure membrane 20, the housing 21 of which is attached to the casing 11 from the outside, and the transmission linkage of which projects through the wall at 22. The differential pressure acting upon membrane 20 is generated by one or more control instruments provided with pneumatic transmission systems responsive to steering impulses caused by change of course, speed of change of course and angular acceleration around the vertical axis of the aircraft in the case of an automatic steering device. Such a transmitting instrument is described in the copending application of Adam Kronenberger for Automatic Steering Device for Aircraft, Serial No. 312,691, filed January 6, 1940, and in the application of Guido Wunsch, Adam Kronenberger and Karl Bauer for Angular Rate Gyroscope for Automatic Steering, Serial No. 312,692, filed January 6, 1940.

The oil pump 18 consists of three plates 23, 24 and 25 which are connected to each other by means of screws 26. The metal plate 24 has openings for three gears 28, 29 and 30, the middle gear of which is driven by the electric motor 13 to which it is connected by means of a coupling 31, of which in this drawing only the ends connected to the motor and to the pump are shown. As it is not difficult to line up the motor with the axis of the gear 29, the coupling may be made rigid.

The two driven gears 28 and 30 have hollow shafts and contain small piston valves 31 and 32. Said valves are connected to spring wires 33 and 34 and are adjustable in their position by screws 35 and 36 to which the wires have been secured. The screws are mounted in a plate 37 which is pivoted by means of a leaf spring 38. The other end of the leaf spring is connected to a bracket 39 resting on the pump. The plate 37 carries an arm 40 to which the linkage 17 and 18 of the membrane 20 is connected.

The free ends of the valves 31 and 32 project into ring-shaped channels 41 and 42, respectively, from which the pressure oil, through openings 43 and 44, seeps into the pump housing. Passages 45 and 46 are connected with the channels 41 and 42 which, for simplicity, in Fig. 6 are shown in the plane of the axes of the pump gears,

but which actually have the position shown in Figs. 1 and 4.

The preferred construction for securing the wires 33 and 34 at both ends is shown in Fig. 3. Each piston valve 31 and 32 is provided with a threaded hole at the top which is adapted to receive slotted and drilled plugs 63' and 64'. Into the holes of these plugs, wires 33 and 34 are inserted, bent over and soldered or welded. The top end of each wire is located in similar plugs 65 and 66 which also have been drilled and slotted and which are secured within the screws 35 and 36, which are preferably knurled on the outside and which may be closed at the top by means of screw plugs 71 and 72. Screws 35 and 36 may be secured against accidental movement by means of springs 69 and 70.

Because of the turning of gears 28, 29 and 30, oil is sucked from recesses 47' and 48' of spacer 19 through the holes 47 and 48 in the lower plate 25 and is forced into the passages 45 and 46 (Figs. 1 and 2). These passages, as shown in Figs. 1 and 6, lead into passages 49 and 50 which are connected to the cylinder 12 and the crank housing 12'', respectively, thereby carrying oil to both sides of the servo motor piston.

Normally, the two valves 31 and 32 have the position shown in Fig. 1, in which the oil forced into the passages 45 and 46 can flow out of the openings 43 and 44 practically without resistance. If, however, because of a steering impulse, the crank 40 is tilted and thereby one of the two pistons is moved downwardly, the respective cross section of the overflow opening is restricted and, therefore, pressure will increase in the corresponding line 45 or 46 which causes an increase in pressure in the chamber 12 or 12'', respectively, of the servo motor. The pressure thereby exerted against the piston 51 is transmitted to the crank 53 and results in a turning motion of the shaft 55 pivoted in an extension 54 of the housing. By attaching a coupling to this shaft, the servo motor may be connected to the rudder of the craft.

The motion of the pistons 31 and 32 within the shafts of the gears 28 and 30 is practically without any friction as the oscillating motion of the pistons is superimposed upon the turning motion of the gears, and as good lubrication is always provided due to the fact that the pump runs completely under oil. In order to prevent back pressure against the pistons 31 and 32 while the oil escapes from the openings 43 and 44, these openings have been widened toward the outside as shown in Figs. 1 and 3, which facilitates the escape of the oil.

According to the invention, the pump 18 is directly attached to the machined surface 17 of the housing 11 with elimination of pipe connections. This is done by means of a spacer 19 which allows short-circuiting the two sides of the servo motor.

Fig. 4 shows a horizontal section through the middle of the short-circuiting valve. The passages 45 and 46 are connected each to a ring-shaped space 56 and 57. These two passages are short-circuited by a piston 58 when the same is in its normal position. For this purpose the piston is provided with lateral holes 59 and 60 which are connected to each other by means of a hole 61 extending axially of the piston. The upper end of the piston, which is made of magnetic material, projects into the core of an electromagnet, the core 62 of which is surrounded by a coil 63. This coil is so connected to the electric motor 13

that it is excited as soon as the motor is started. The magnetic field now pulls the piston 58 against the action of a leaf spring 64 into the coil and thereby interrupts the short-circuiting connection between the holes 59, 60 and the ring-shaped spaces 56 and 57. Inasmuch as the passages 45 and 46 are no longer short-circuited, motion of the steering pistons 31 and 32 can result in pressure which will result in motion of the servo motor piston 51, as previously described. In order to limit this pressure, two safety valves have been attached to the passages 45 and 46 which are connected to passages 64' and 65 in the spacer 19 (Fig. 4). Fig. 5 shows one of the two valves in detail.

The valve housing has on the outside a thread 67 by means of which it is screwed into the spacer 19. A hole 68 provided on the bottom affords the connection to the passages 65 or 64', respectively. The opening 68 is kept closed by means of the valve 69' as long as the oil pressure does not overcome the force of the spring 70', which may be adjusted by means of the screw plug 71. Oil which might escape through the valve flows through the hole 72' back into the instrument housing. In order not to restrict the entrance of the oil into the suction lines 47 and 48 in Fig. 4, the spacer 19 is hollowed out at 47' and 48' (Fig. 4). Between the lower pump plate 25 and the short-circuited element 19 there is provided a channel 82 (Fig. 1) which serves the purpose of carrying away the pressure oil which might escape along the passage 83 due to slight leakage through the bearings. In this way no one-sided pressure on the lower part of the shaft of gear 29 can accumulate, which might press the gear upwardly against plate 23 and which might cause considerable friction.

The connections 73 and 74 of the diaphragm housing 21 are shown in Fig. 2 as being located in one plane. This was done in order to better show their construction. As shown in Fig. 1, the connections are actually located to the right and left of the diaphragm. It has been mentioned earlier that the diaphragm is attached to the housing 11 from the outside and that the connecting linkage projects from the wall into the inside. In order to keep the housing tight against the diaphragm casing, two small soft membranes 75 and 76 have been provided which are rigidly connected to the diaphragm 20, which is preferably made of metal. The connection is secured by nuts on a pin 77, the end of which is threaded. The other end of the pin carries a spring wire 78 which terminates in a little screw 84 which effects the connection with the crank 40.

In order to be sure that the metal diaphragm 20 can move without restriction, the small auxiliary membranes 75 and 76, as shown in Fig. 1, have been made loose enough so as not to counteract the motion of the membrane 20. In the present design the pipe lines 73 and 74 are kept below atmospheric pressure, so that the outer pressure tries to push the membranes 75 and 76 into the housing 21. If pressure greater than atmospheric pressure is to be used, the membranes should be formed in the opposite way so that they are bulging toward the outside. The connecting pin 77 is surrounded by the previously mentioned protecting pipe 79, which serves the purpose of preventing the oil in the housing from reaching the auxiliary membrane 76 in case the aircraft is banking.

The operation of the machine is started by closing a switch (not shown) to cause the motor

13 to run. The coil 63, which is connected parallel thereto, is excited at the same time and the short-circuit between the passages 45 and 46 is removed. If the airplane deviates from the desired flying attitude, a differential pressure is produced in the known way and influences the diaphragm 20, which causes tilting of the lever 40. As explained before, this causes differential pressure in the passages 45, 46, 49 and 50 which moves the servo motor piston and causes a rudder movement in a sense to correct for the original deviation.

It is possible to use the rudder machine for desired motions of the rudder which may be controlled by a hand switch. In place of the differential pressure diaphragm 20, an electric relay

or a rotary magnet may be used without deviating from the fundamental principle of the invention.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

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The first part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present. The author then proceeds to discuss the various factors which have shaped the development of the United States, including the influence of the British, the Spanish, and the French.

The second part of the paper discusses the role of the United States in the world. It is argued that the United States has a special responsibility to the world, and that it should use its power to promote peace and justice. The author then discusses the various ways in which the United States has fulfilled this responsibility, including through its foreign policy and its aid to other countries.

The third part of the paper discusses the future of the United States. It is argued that the United States has a bright future, and that it will continue to play a leading role in the world. The author then discusses the various challenges which the United States will face in the future, and the ways in which it can meet these challenges.

The fourth part of the paper discusses the role of the individual in the United States. It is argued that every individual has a responsibility to the United States, and that it is the duty of every citizen to contribute to the development of the country. The author then discusses the various ways in which individuals can contribute to the development of the United States, including through their work, their civic participation, and their personal lives.

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G. WUNSCH ET AL
RUDDER MACHINE FOR AUTOMATIC PILOTS
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Serial No.
366,364
3 Sheets-Sheet 1

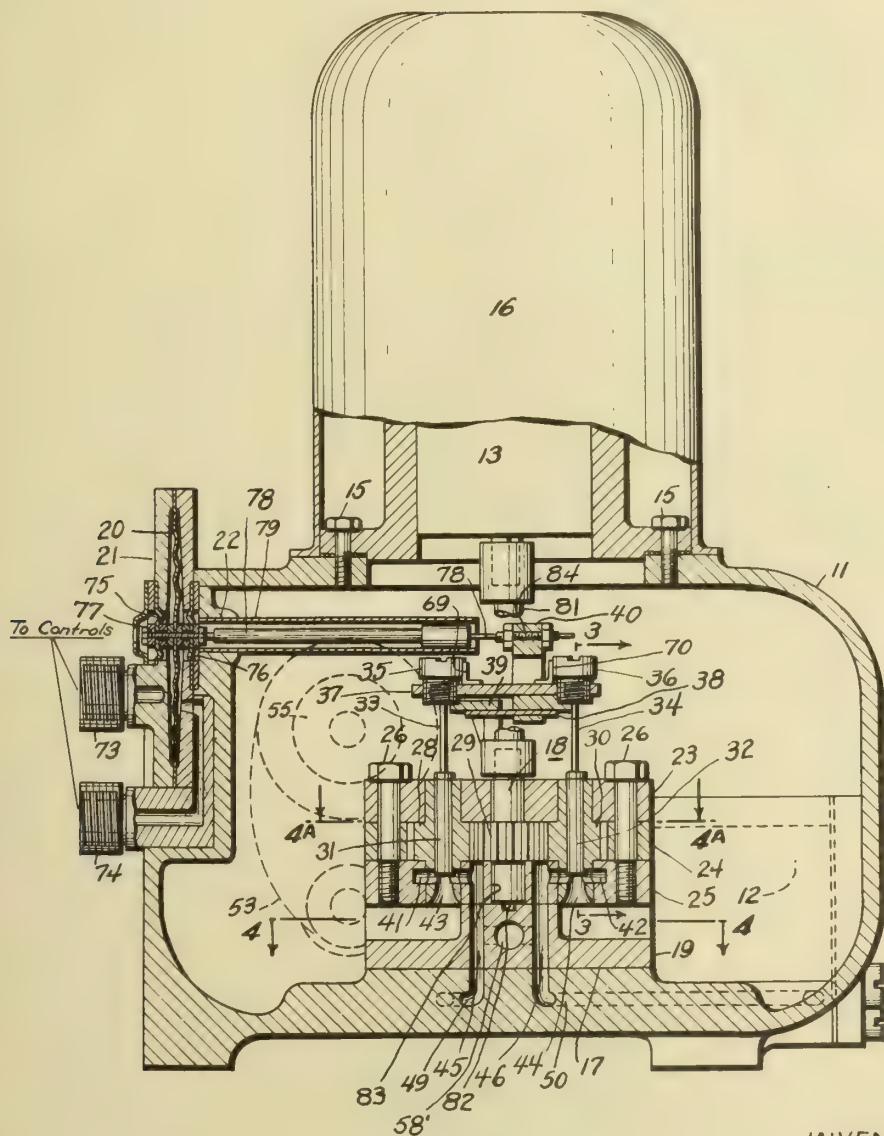


FIG. 1

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3 Sheets-Sheet 2

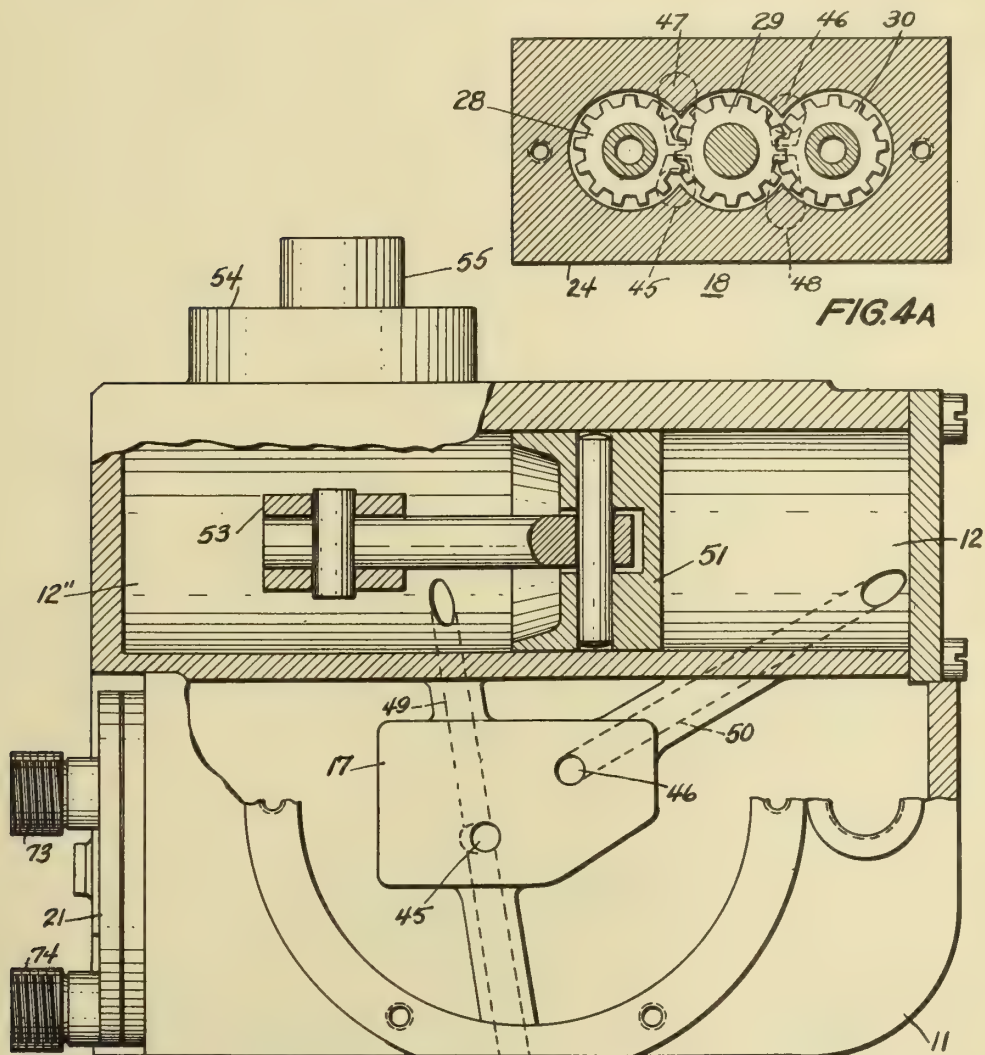


FIG. 4A

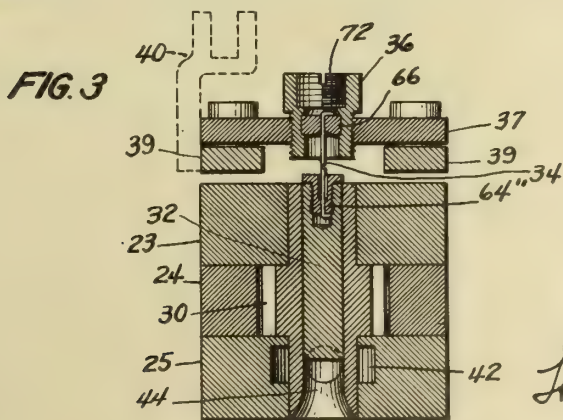


FIG. 3

FIG. 2

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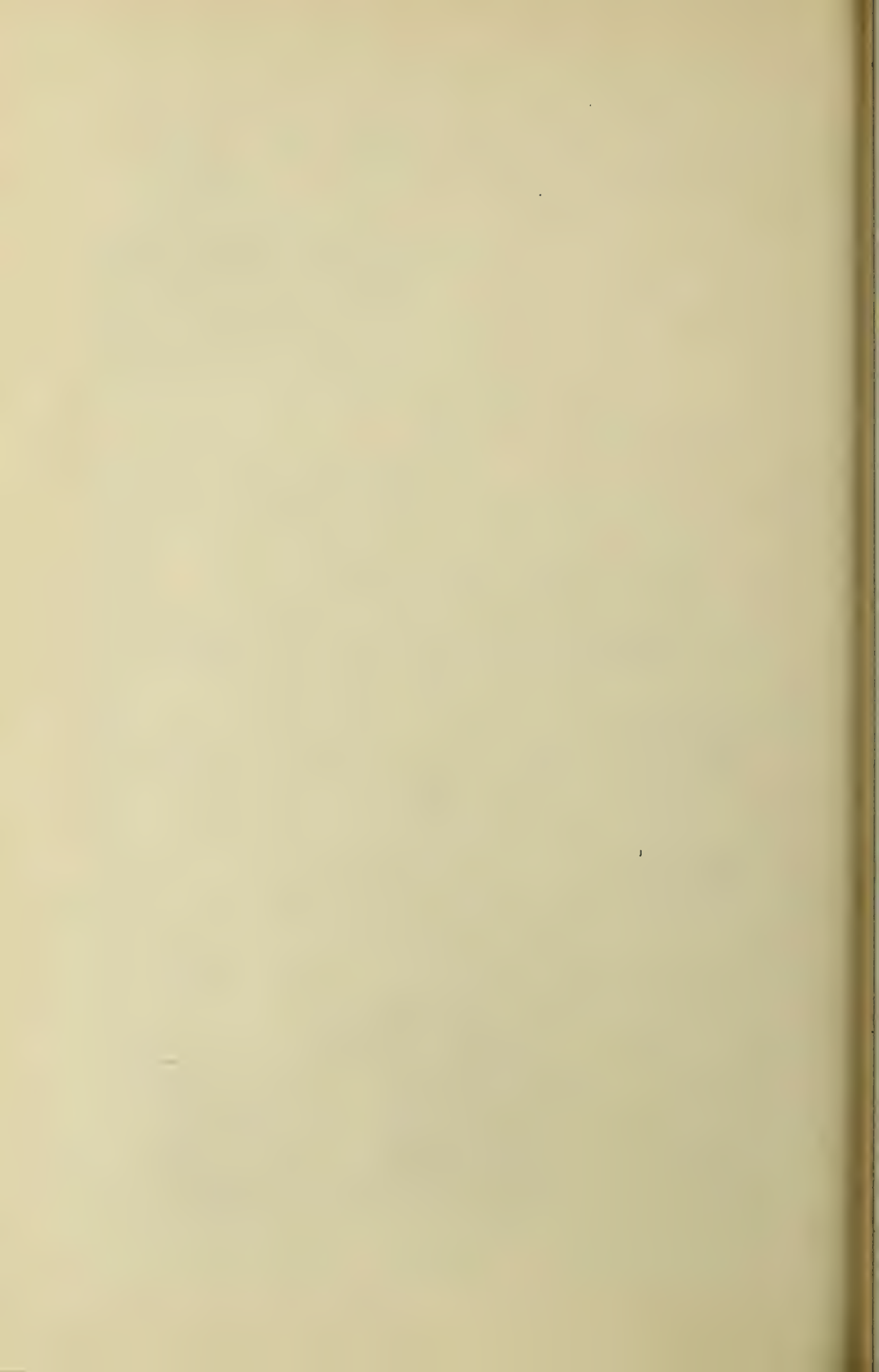


FIG. 6

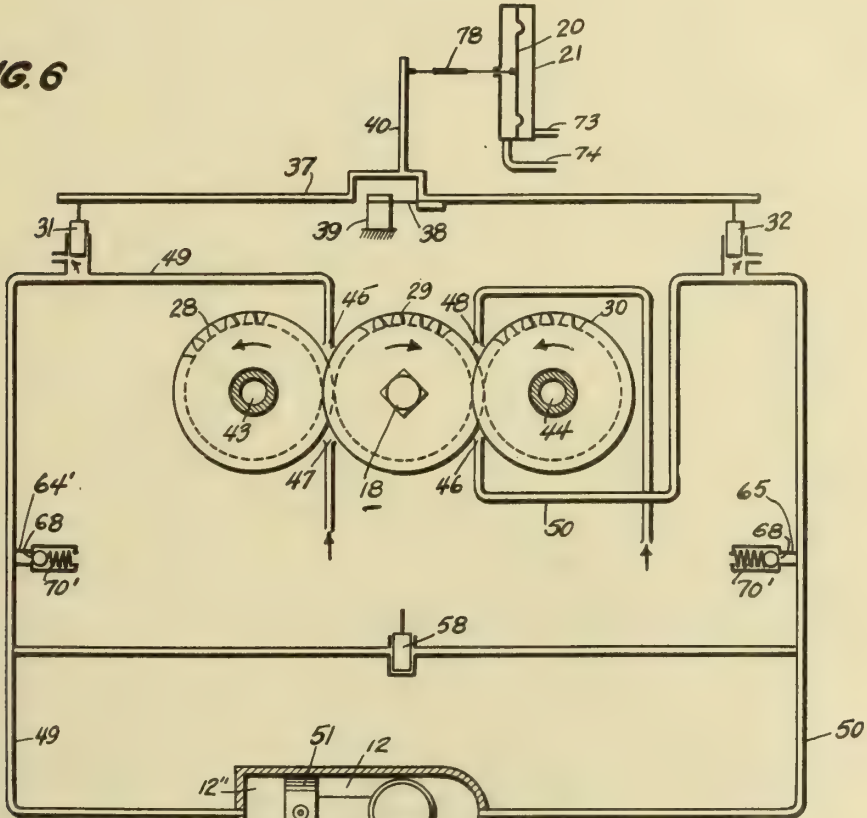


FIG. 4

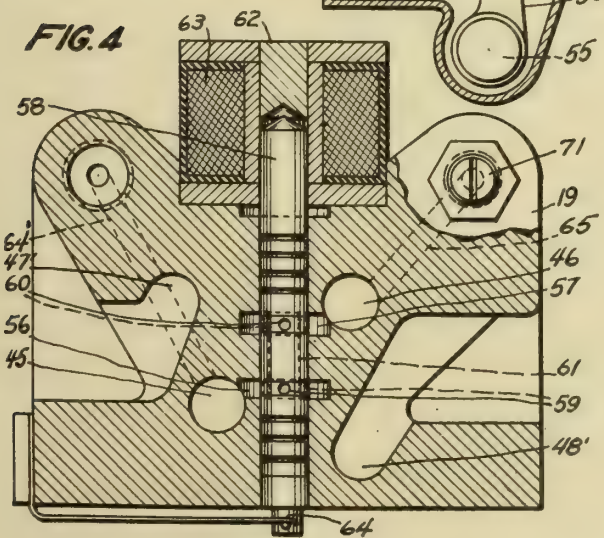
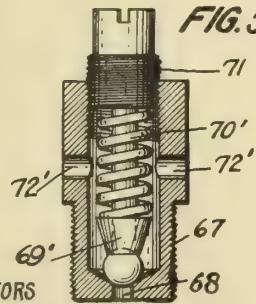


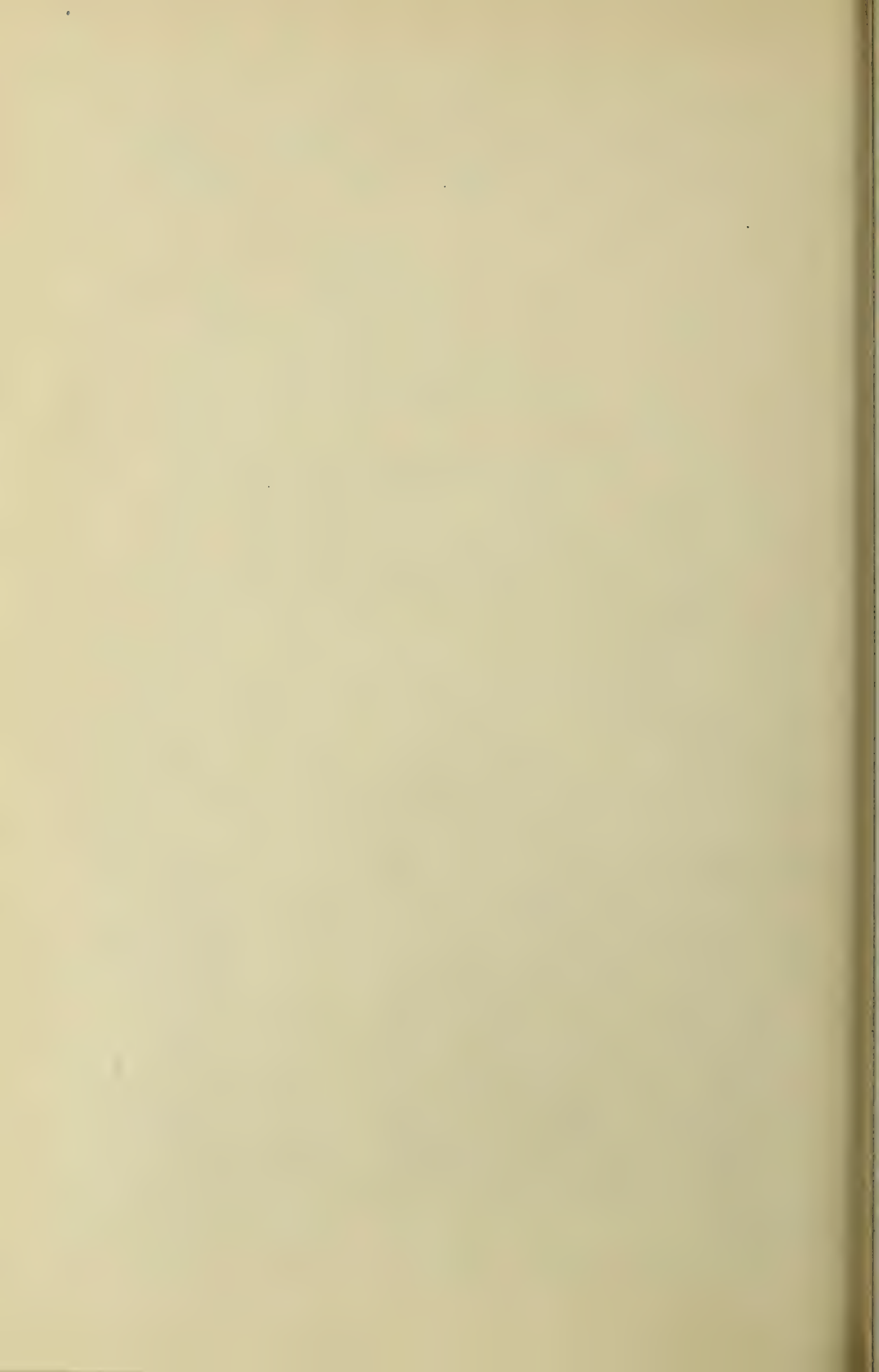
FIG. 5



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HYDRAULIC DRIVES

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Application filed November 23, 1940

This invention relates to hydraulic drives and refers more particularly to a device regulating the speed of a drive actuated by hydraulic means. This device may be used in conjunction with all machines wherein the speed of a driven body is subjected to certain variations resulting from changes in the resistance opposing the movement of the actuated body. However, the device constituting the subject matter of the present invention is particularly applicable to machine tools, the feed movement of which is actuated by a hydraulic drive, and in which the speed of the feed movement is dependent upon the feed resistance.

An object of the present invention is to eliminate this dependency between the speed of the drive and the resistance by the provision of a special regulating device.

Another object is the provision of a regulating device for hydraulic drives of machine tools and the like which makes it possible to maintain a substantially uniform speed of the drive or of the feed movement despite changes in the resistance opposing the drive or the feed movement.

Other objects of the present invention will become apparent in the course of the following specification.

In accomplishing the objects of the present invention it was found advisable to provide a hydraulic drive having a throttle valve which is adjustable at will and which may be used for any desired step-wise variation in the speed of the drive or the feed movement.

In accordance with the present invention, this throttle valve is connected with an automatically operable regulating device which may be situated either in that part of the hydraulic circuit which supplies the operating fluid to the driving mechanism, or in that part of the circuit through which the fluid is withdrawn from the driving mechanism.

The regulating device varies the amount of fluid flowing to or from the driving mechanism depending upon the difference in fluid pressure prevailing on both sides of the throttle valve, and upon an additional force which maintains constant this difference in pressure.

By means of this regulating device, the difference in pressure between the two sides of the throttle and valve and, consequently, the amount of fluid flowing through the throttle valve are always maintained constant and entirely independent of the specific amount of pressure existing on any one side of the throttle valve. Therefore, the resistance exerted upon the movable

part of the machine has no influence whatever upon this pressure difference. Since the speed of the drive is determined solely by the amount of fluid supplied to it and since this amount is maintained constant by the regulating device, the speed of the drive or of the feed movement will always remain the same irrespective of any possible variations in the resistance opposing the movement.

The invention will appear more clearly by the following detailed description when taken in connection with the accompanying drawings showing, by way of example, preferred embodiments of the inventive idea, as applied to feed drives of machine tools.

In the drawings:

Figure 1 is a diagram illustrating a hydraulic drive constructed in accordance with the principles of the present invention.

Figure 2 is a diagram showing a hydraulic drive of a somewhat different form.

Figure 1 shows a carriage 1 of a machine tool, which is reciprocable in the direction of the arrows x_1 and x_2 . The carriage 1 is connected with a rod 2 which extends parallel to the direction of movement of the carriage and which carries a piston 4 intermediate its ends. The piston 4 is movable along with the rod 2 in a casing 3 through which the rod 2 extends. There is a fluid-tight seal between the adjacent surfaces of the rod 2 and the casing 3.

The fluid used to operate the hydraulic drive is situated within a container 9. A pump 8 transmits the fluid under pressure from the container 9 to a pipe 5b, which is connected with the pump 8.

The pipe 5b is connected with a regulating valve which includes a casing 7 and a multiple piston 6 situated within the casing. A pipe 5a connects the interior of the casing 7 with the interior of the casing 3 and is used to transmit fluid under pressure to the piston 4.

A pipe 5c is in communication with the pipe 5b close to the pump 8. The pipe 5c leads to a relief valve 5d which is provided with a pipe communicating with the interior of the container 9.

Fluid is withdrawn from the cylinder 3 through a return flow pipe 10 connecting the interiors of the cylinder 3 and the casing 7. The return flow circuit of the hydraulic drive also includes a pipe 11a one end of which has two branches which are in communication with the interior of the casing 7. The opposite end of the pipe 11a has two branches 15 and 16.

The branch pipe 16 leads to an adjustable

throttle valve 12, while the branch pipe 15 is in communication with the space 17 of a regulating device consisting of a cylinder 14, a piston 13 and a spring 23. The piston 13 is movable within the cylinder 14 in the direction of the arrows y_1 . A pipe 18 connects the throttle valve 12 with the space 19 of the cylinder 14.

The spring 23 is situated within the space 19. The space 19 is also in communication with the opening 14a of a pipe 11b leading to the container 9. The spring 23 is compressed and one end of the spring is supported by a wall of the container 14 while its other end presses against a surface 20 of the piston 13.

The piston 13 covers a part of the opening 14a, so that a movement of the piston 13 within the container 14 will increase or decrease the operative cross sectional area of the opening 14a.

The device is operated as follows:

The pump 8 transmits fluid under pressure from the container 9 and through the pipe 5b, the regulating valve 6, 7 and the pipe 5a into the right hand space within the cylinder 3 (looking in the direction of Figure 1).

The fluid will move the piston 4 and the rod 2 connected therewith in the direction of the arrow m , thereby moving the fuel carriage in the direction of the arrow x_1 .

A resistance W is opposed to this feed movement of the carriage 1 and this resistance is overcome by the pressure of the fluid acting in the direction of the arrow m .

Due to this pressure of the fluid, that part of the fluid which is situated in the left hand space of the cylinder 3 (looking in the direction of Figure 1), as caused to flow through the pipe 10 and the regulating valve 6, 7 into the pipe 11a.

Thence the fluid flows through the pipe 16 and the throttle valve 12 into the pipe 18. As already stated, the adjustment of the throttle valve determines the amount of pressure of the fluid, so that the device may be set for different speeds of the feed of the tool carriage 1.

However, these different speeds depend upon the extent of the resistance W . Due to the throttling action there is a smaller fluid pressure in the pipe 18 which connects the valve 12 with the regulating device 13, 14, than in the pipes 15 or 16. Due to the provision of the pipe 15, the pressure of the fluid in the space 17 of the cylinder 14 is the same as that in the pipe 16 on one side of the throttle valve 12. The pressure in the pipe 18 on the other side of the throttle valve 12 is the same as that in the space 19 of the container 14.

The difference in fluid pressure in spaces 17 and 19 is equalized by the force P of the spring 23, which is selected accordingly and is correspondingly tensioned.

If the force W constituting a resistance to the feed movement of the carriage, is increased, for instance, then the pressure of the fluid flowing through the pipes 11a, 15 and 16 will be diminished. Consequently, the pressure within the space 17 of the cylinder 14 will diminish also and the force P of the spring 23 will move the piston 13 to the left (looking in the direction of Figure 1). The front surface 20 of the piston 13 will open an additional portion of the cross sectional area of the opening 14a. Therefore, the amount of fluid flowing out of the space 19 and through the pipe 11b back to the container 9 will be increased. The pressure of the fluid within the space 19 will decrease until this pressure jointly with the practically constant force P of the spring

23 will become equal to the new pressure prevailing in the space 17.

Consequently, the difference in pressures prevailing in the spaces 17 and 19, as well as in the pipes 16 and 18, will remain the same despite the change in the resistance W .

Since, however, the difference in pressure prevailing at the two sides of the throttle valve 12 determines the speed of movement imparted to the piston 4, this speed will remain the same despite the change in the resistance W .

The amount of fluid flowing back of the container 9 remains the same, due to the increase in the operative surface area of the outflow opening 14a, although the extent of the drop in pressure between the space 19 and the container 9 has been changed.

The hydraulic drive shown in Figure 2 of the drawings includes a cylinder 25 containing a piston 26 which is connected on one side with a piston rod 27, so that the two side surfaces of the piston 26 are of different size. The comparatively wide piston rod 27 extends through a suitable opening formed in the cylinder 25 and is attached to the carriage of the machine tool.

The fluid used to operate the piston 26 is circulated by a pump 34 situated within a container 28. A pipe 35 connected to the pump 34 is provided with a branch pipe 36 which leads to a regulatable throttle valve 37. The pipe 35 communicates with the space 32a within a cylinder 32 of the regulating device. The cylinder 32 contains a piston 39 which is loaded by a spring 41. Consequently, in this construction the regulating device 32, 39 is inserted in that part of the hydraulic circuit which transmits fluid under pressure to the cylinder 25.

A pipe 31 connects the space 32b within the container 31 with a three way cock or change over valve 30. The valve 30 is connected with the space 25a within the cylinder 25 by a pipe 29 and has a valve body provided with three passages which connect the pipe 29 with the pipe 31 in the position shown in Figure 2. The other end of the cylinder 25 is in communication with the pipe 35 by a return flow pipe 33. Another pipe 29a leads from the valve 30 to the interior of the container 28 for the fluid.

The throttle valve 37 is connected with the space 32b within the cylinder 32 by the pipe 38.

The regulating device 32, 39 includes a spring 41 which presses against the piston 39 and which maintains the piston in a position in which it partly covers the opening 31a of the pipe 31.

The device is operated as follows:

The pump 34 causes a flow of liquid under pressure through the pipe 35, the pipe 36, the throttle valve 37, the pipe 38, the space 32b within the container 32, the pipe 31, the valve 30 and the pipe 29 into the space 25a of the cylinder 25.

The pipe 33 is provided with a suitable non-return valve which is not shown in the drawings.

The fluid under pressure within the space 25a moves the piston 26, the piston rod 27 and the tool carriage connected therewith in the direction of the arrow Z . The speed of this movement is determined by the position of the throttle valve 37. The difference in fluid pressures prevailing on both sides of the throttle valve 37 determines the amount of the liquid which operates within the cylinder 25.

If the resistance W opposed to the movement of the tool carriage remains unchanged, a fluid pressure will arise within the space 25a and in the pipes 29 and 31, which is necessary to over-

come the resistance **W** and the pressure exerted upon the annular surface of the piston **26** around the piston rod **27**.

The pump **34** transmits the fluid under a higher pressure through the pipes **35** and **36** and into the space **32a** within the cylinder **32**. This higher pressure, which is also exerted upon the adjacent surface of the piston **39**, is balanced by the force **P** of the spring **41** and the pressure of the fluid upon the surface **42** of the piston **39**, so that the piston **39** is maintained in the illustrated position. There is an equilibrium when fluid pressure in the space **32a** to the right of the piston **39** (looking in the direction of Figure 2) is equal to the force **P** of the spring **41** plus fluid pressure in the space **32b** to the left of the piston **39**.

In the illustrated position, the edge of the surface **42** of the piston **39** covers a portion of the opening **31a** of the pipe **31**. Any movement of the piston **39** will change, therefore, the operative cross sectional area of the opening **31a**. The area of the opening **31a** is varied depending upon the resistance opposing the movement of the piston **26** and, consequently, the fluid pressure in the pipes **29** and **31**.

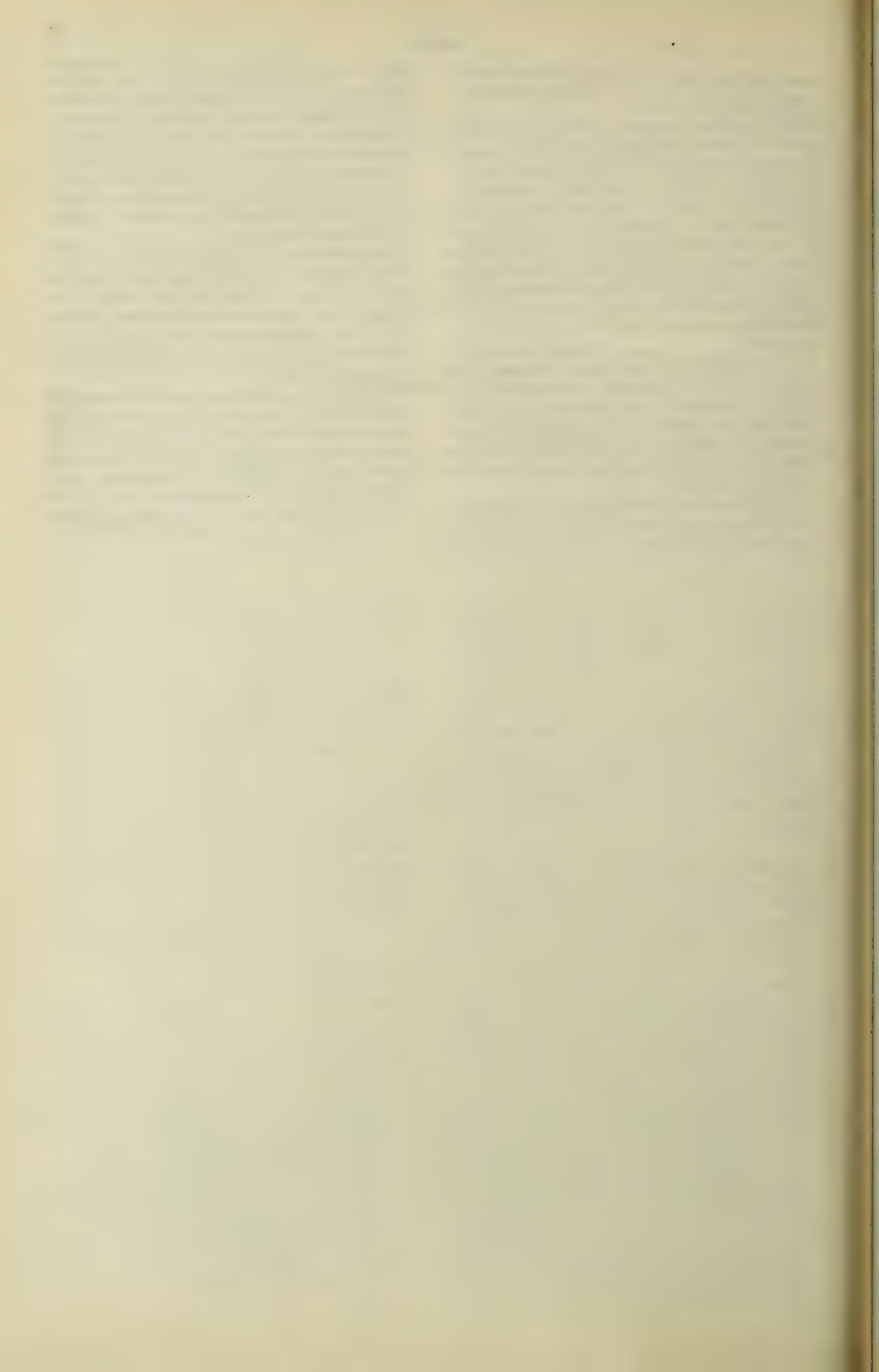
If, for instance, the resistance **W** exerted upon the piston **26** is increased, then the pressure of the fluid in the pipes **29**, **31**, and **38** is increased

also. The piston **39** is then moved to the right (looking in the direction of Fig. 2), so that the operative area of the opening **31a** is increased, and the already existing difference in pressures prevailing in the space **32b** and in the pipes **29** and **31**, is diminished. However, the difference in pressures prevailing in the pipe **38** and in the pipe **36** remains the same, so that the amount of fluid flowing through the throttle valve **37** and, consequently, the speed of movement of the piston **36** are not changed.

If the resistance **W** becomes smaller, the piston **39** will move to the left and in that case also the difference in pressures prevailing in the pipe **38** and in the pipe **36** will not change. The amount of the flowing fluid will remain the same due to the change in the operative cross sectional area of the opening **31a**, despite the change in the difference in pressures prevailing in the spaces **32b** and **25a**.

It is apparent that the specific illustrations shown above have been given by way of illustration and not by way of limitation and that the structures above described are subject to wide variation and modification without departing from scope or intent of the invention. All of such variations and modifications are to be included within the scope of the present invention.

ROBERT OBTRESAL,

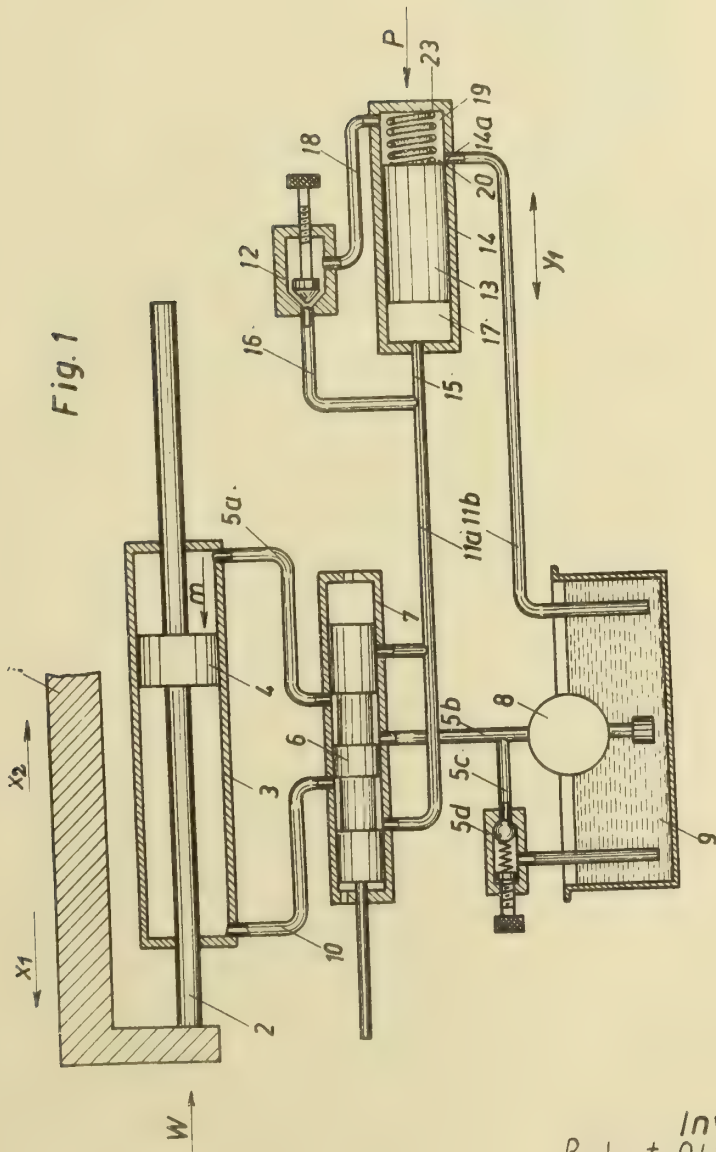


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R. OBTRESAL
HYDRAULIC DRIVE
Filed Nov. 23, 1940

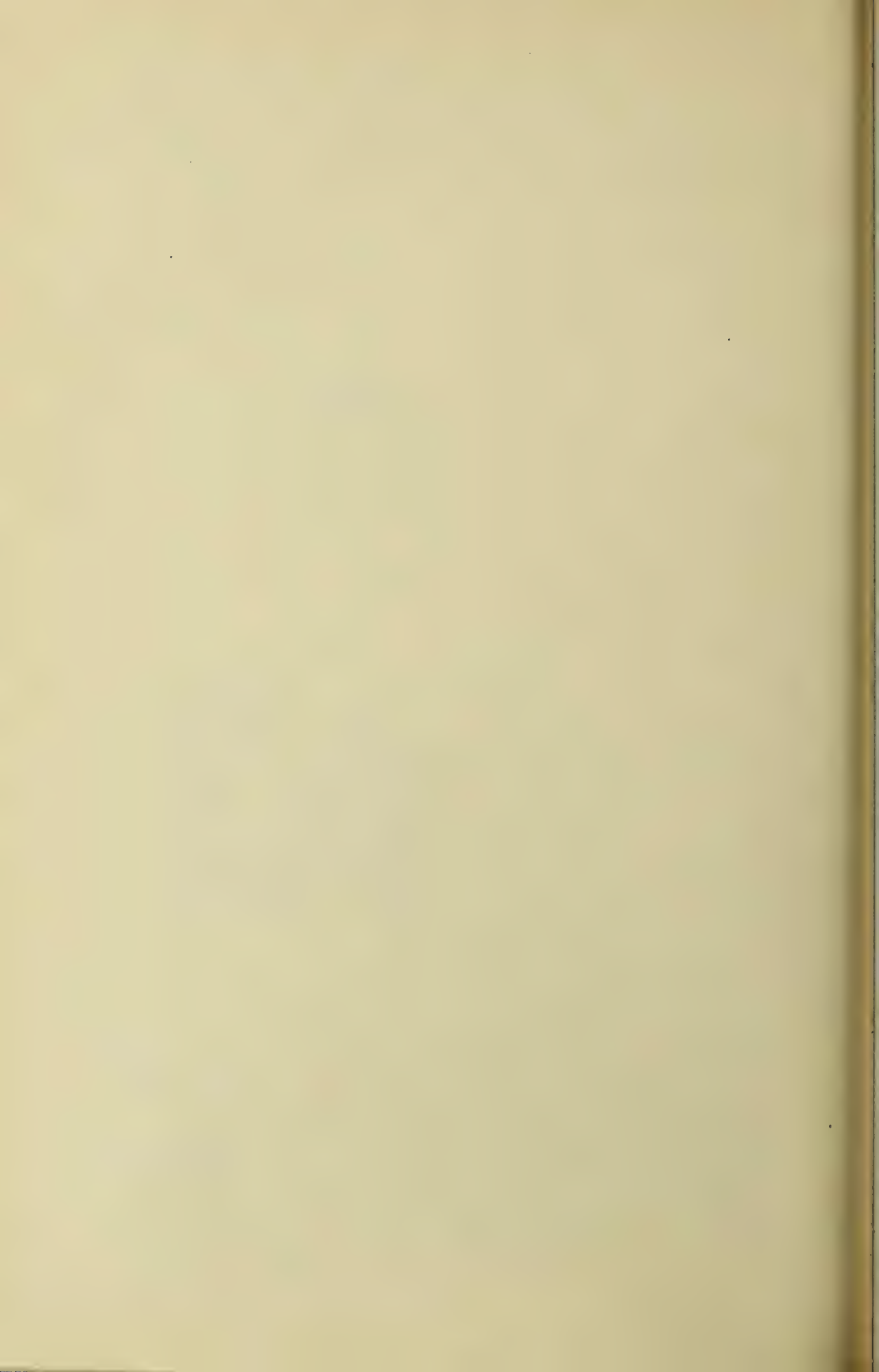
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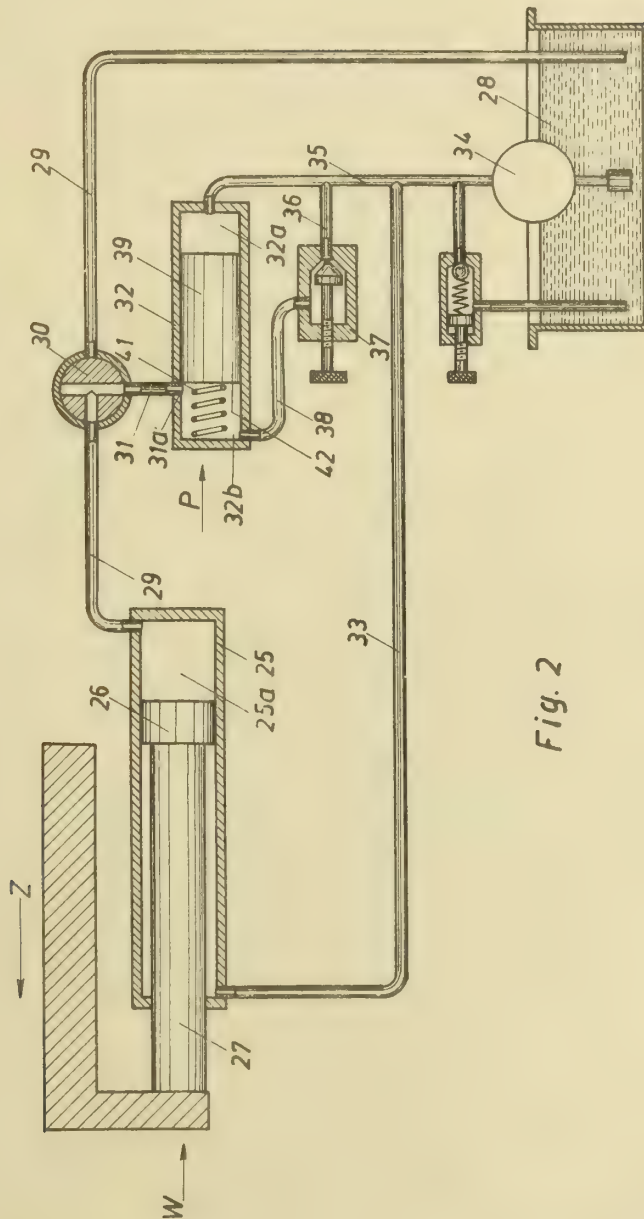
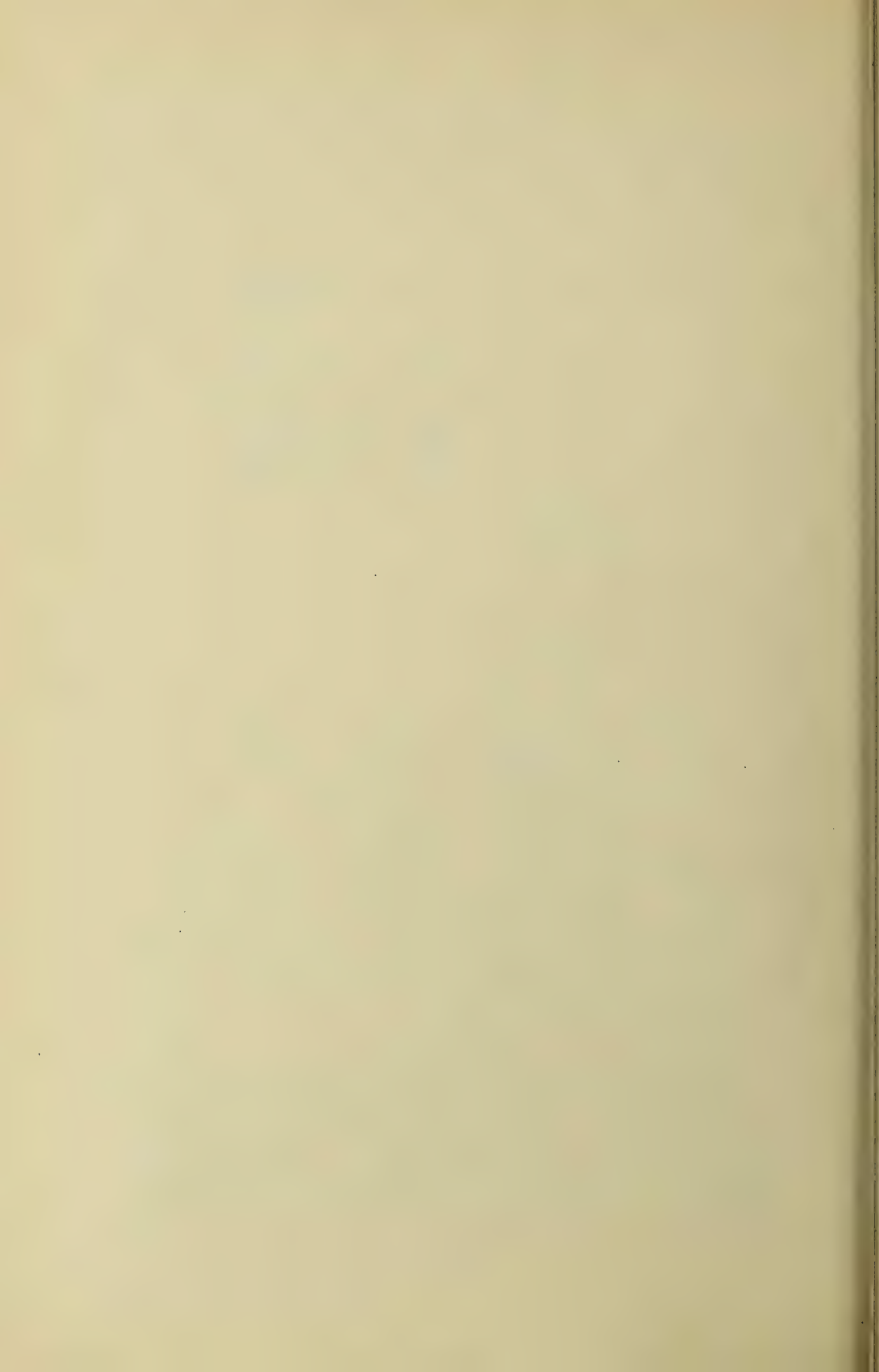


Fig. 2

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SOUND ABSORBING OR ATTENUANT ARRANGEMENT FOR REVERBERANT ROOMS

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Application filed November 26, 1940

Rooms or spaces which are non-absorbent for sound often offer the difficulty that such treatment of the surfaces and other parts of the room as is required for acoustic reasons conflicts with the demands concerning the arrangement of the interior of the room from an architectonic, illuminating and other angles. In fact, the architect or the illuminating engineer often refuses to permit the use of sound absorbent or attenuating bodies or materials for mechanical reasons on the ground that the architectonic impression of the room may be impaired.

In the majority of large spaces such as churches, congress halls, auditoria, etc., reverberation mostly in the lower frequency ranges is particularly long because the major part of the sound deadening or attenuation is caused by the persons present, the sound absorption increasing markedly in the direction towards higher frequencies.

It is known in the prior art to use air resonators for attenuation, especially inside the range of low frequencies. In arrangements known in the art, a perforated or apertured plate which may consist of wood, structural plates, apertured brick or the like, is placed anteriorly of a fixed and firm wall spaced a certain air distance apart therefrom. The natural period and the attenuation of such resonators must be so chosen that the desired attenuation in the bass ranges is secured.

In numerous instances, however, it is not feasible to so design the walls of the room in a way as just outlined or to build in addition anteriorly of the wall as just stated. In such cases, a makeshift according to the invention is to resort to the floor to an extent more than has heretofore been usual for the purpose of insuring sound deadening. To be more precise, the floor according to

the invention is in the form of a grate capable of carrying load, the apertures in the flooring leading particularly to attenuated cavities or spaces so that as in the known arrangement an air resonator attenuation is produced. The under surface of these cavities is preferably hard and smooth in order to allow cleaning either from above after removal of the grating or from below by way of closable openings. The grates may be covered by carpeting inasmuch as such carpets practically represent no obstacle for sound in the lower range. In other words, the operation of air resonators would not be substantially impaired as a result. The dimensions of the resonators should suitably be made slightly different in order that a frequency band rather than any definite or select frequencies may be attenuated.

One appreciable advantage of the new arrangement is that the sound absorbent floor is particularly active when the interior is only partly filled, while when there is a full audience the effect is naturally diminished. The consequence is that the reverberation period is independent of the filling of the auditorium and is practically constant and stable, a fact which is of great importance for the mounting of the loudspeaker equipment.

The drawing illustrates an exemplified embodiment of the object of the invention. Provided in the floor are cavities $H1, H2 \dots H_n$ which communicate with the space or room through slots $O1, O2, \dots O_n$. The lower surface of the cavities is hard and smooth in order that cleaning may be facilitated. If desired, and as shown in the drawing, closable cleaning ports $S1, S2 \dots S_n$ could be provided. The grating containing openings $O1, O2 \dots O_n$ may be removable.

HEINRICH BENECKE.

THE HISTORY OF THE UNITED STATES

OF THE

AMERICAN PEOPLE

FROM THE FIRST SETTLEMENTS TO THE PRESENT

The history of the United States is a story of growth and development. It begins with the first settlers who came to the New World in search of a better life. These early pioneers faced many hardships, but they persevered and built a new society. Over time, the United States grew from a small colony into a powerful nation. It fought wars, both against Britain and among itself, but it always emerged stronger and more united. The American people have always been a people of freedom and opportunity. They have built a nation that is the envy of the world. Today, the United States stands as a beacon of hope and a model of democracy. Its history is a testament to the power of the human spirit and the ability of a people to overcome adversity and build a better future.

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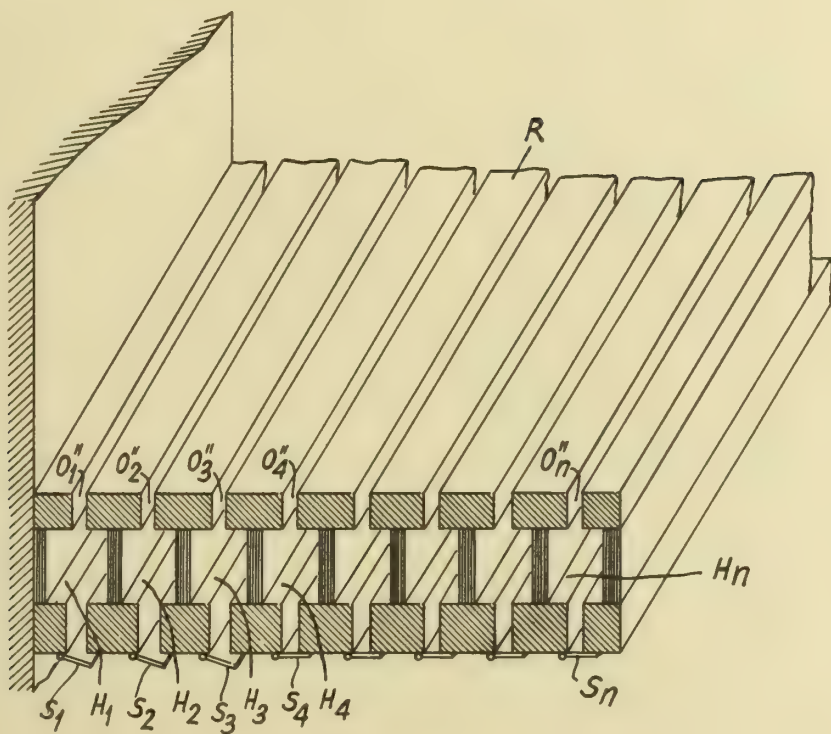
BY A. P. C.

H. BENECKE

SOUND ABSORBING OR ATTENUANT ARRANGEMENT
FOR REVERBERANT ROOMS
Filed Nov. 26, 1940

Serial No.

367,214



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ALIEN PROPERTY CUSTODIAN

REACTION PROPELLING DEVICE WITH SUPERCHARGED ENGINE

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Mantes, France; vested in the Alien Property
Custodian

Application filed November 28, 1940

The supercharging units of aviation engines, which are constituted by a turbine driven by the exhaust gases and actuating a compressor, are now capable of a very high efficiency. It follows that the power that can be supplied by the gas turbine exceeds what is strictly necessary for driving the compressor. In order to restore the power balance, a portion of the gases have been evacuated into the atmosphere, or a supplementary resistance has been created by a governor, but these arrangements involve a loss of energy.

It has also been endeavored to utilize this excess of power by intensifying the scavenging of the engine, which has been brought up to 60 per cent and even more, but the advantage of this operation is very small because the gain of power which results therefrom for the engine is negligible.

The object of the present invention is to utilize this excess of energy of the exhaust gases with the maximum efficiency in order to improve the propelling effect applied to the airplane, which is tantamount to a material increase of the output of the motor-propeller unit.

According to the essential feature of the present invention, I combine a thermal engine with a turbine operated by the exhaust gases and driving a supercharging compressor and with a reaction nozzle.

This arrangement permits of utilizing in the reaction nozzle the excess of power of the exhaust gases with a very high output, even when the speed of the airplane is relatively low. It even permits of increasing the power of the motor-propeller system without modifying the engine or the fuel consumption thereof, by slightly increasing the exhaust counterpressure. Finally, it makes it possible to obtain a good regulation of the main engine without loss of power so that said engine can thus preserve its maximum efficiency for all values of the power developed.

Other features of the present invention will result from the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described, with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 shows the general arrangement of an aviation engine system made according to the present invention;

Fig. 2 is a diagrammatical view showing a device for controlling the section of the nozzle above referred to;

Figs. 3 and 4 are views, similar to Fig. 2 showing modifications.

Fig. 5 is a diagrammatical view showing the place of the regulating means;

Fig. 6 shows an embodiment of the invention provided with an air by-pass leading to a point behind the gas turbine;

Fig. 7 shows an embodiment in which the compressor is divided into two portions;

Fig. 8 is a view similar to Fig. 7, showing a modification;

Fig. 9 shows an embodiment in which air is fed to the reaction nozzle without compressor;

Fig. 10 is an explanatory developed view of the turbine wheel in the case of distinct and separate exhausts.

Fig. 1 shows an aviation engine *a*, which, in this case is supposed to be of the usual gasoline type, with a carburetter, but which might also be of any other type, either of the explosion or combustion kind.

Compressor *c* drives air at *e* through an orifice which is preferably turned in the direction in which the airplane is travelling, in order to take advantage of the compression created by the relative velocity of air. It discharges this compressed air to the suction side of the engine, through the carburetter *f*.

The exhaust gases from the engine, which are at a pressure higher than atmospheric pressure at the height at which the airplane is travelling, are brought to the gas turbine *d*, where they expand in the distributing nozzles and drive wheel or wheels *h*. When leaving said turbine the gases again expand in reaction nozzle *g*, which is turned in the direction opposed to that in which the airplane is travelling. The gases thus produce, owing to the relatively high velocity they have, a driving impulse on the airplane. This action is equal to the product of the mass of gas delivered per second by their relative outlet velocity.

The chief advantage of this arrangement is that it produces a useful work which serves to the propulsion of the airplane, whereas the corresponding loss produced by counter-pressure at the exhaust is much lower. This results from the following calculation:

Considering for instance the case of an engine of 1000 HP, having a scavenged volume of 600 liters per second, it is known that the output of the exhaust gases of this engine is approximately 1000 grammes per second. If the airplane is flying at a height of 5000 metres, corresponding to an atmospheric pressure of 0.5

kgs per square centimeter, the excessive pressure necessary for imparting to these gases, which are supposed to be at a temperature of 500° C., a velocity of 300 meters per second is about 0.097 kg. The thrust produced by these gases is then:

$$F = m \times V = \frac{1}{9.80} \times 300 = 30.6 \text{ kgs.}$$

If the airplane is moving with a velocity of 150 meters per second, that is to say 540 kilometers per hour, the useful work produced by this thrust is

$$\frac{30.6 \times 150}{75}$$

that is to say 61.2 HP.

This corresponds approximately to a power of 80 HP on the propeller shaft. Now, this negative work due to the increase of the counter-pressure of 0.097 kg. which is produced is equal to the product of this excess of counter-pressure by the volume swept, that is to say $0.600 \times 0.097 \times 10,000$, which gives 582 kgm, or about 8 HP.

Thus, the application of the reaction nozzle in this case ensures a gain of power which is quite substantial in comparison with the results obtained by means of the devices used at the present time. Furthermore, the presence of the nozzle ensures an easy self-regulation of the propelling system. It suffices to provide the reaction nozzle with a device for varying the section of the outlet orifice thereof. It is thus possible to vary the counter-pressure created by this nozzle, and, therefore, the flow through the gas turbine for a given pressure.

This arrangement has the same advantages as the arrangement which would consist in varying the section of the distributing nozzles of the gas turbine but it has the great advantage that it can be operated in flight, owing to a control placed under reach of the pilot's hand.

This results from the following considerations: If the pilot increases the section of the nozzle, the counter-pressure produced by said nozzle is reduced. Consequently, the output of the gas turbine will tend to increase for an unchanged pressure supplied by the compressor therefore, as the driving power of the turbine comes to exceed the resisting power of the compressor, the turbo-blower unit will tend to accelerate and thus increase the supercharging of the propelling engine, which permits of increasing the power supplied by said engine when the throttle valve of carburetter *f* has already been, for instance, fully opened. On the contrary, the same operation in the reversed way, that is to say the reduction of the section of nozzles *g*, reduces the power supplied by engine *a*.

This regulation of power takes place under truly economical conditions, because if the carburetter throttle valve remains fully opened, despite the reduction of the power of the engine, this avoids the losses by wiredrawing which would otherwise take place if the throttle were partly closed, and the efficiency of the propelling engine remains practically constant.

This arrangement is particularly advantageous when it is combined with the provision of a by-pass connecting together the intake and the exhaust of the engine, as shown in dotted lines in Fig. 1, at *b*.

Various means may be employed for varying the section of the outlet nozzle. Figs. 2, 3 and 4 show some of these arrangements.

In the embodiment of Fig. 2, a piece *j* of pointed shape is placed in the central part of

the nozzle and it can be moved through a rod *k* controlled by the pilot through suitable means. When moving forward piece *j* toward the aperture of nozzle *g*, the section of said aperture is reduced, and inversely.

In the embodiment of Fig. 3, the nozzle *g* is divided into a plurality of elementary nozzles by means of fine or blades *l*. A movable shutter *m* operated by the pilot through any suitable control means permits of obturating a variable number of nozzles formed between blades *l*. I thus obtain, according to the number of elementary nozzles left in operation, an adjustment of the section of nozzle *g*.

In the embodiment of Fig. 4, the principle is the same, but shutter *m* is of circular section and pivots about an axis *o*, which undergoes the effort corresponding to the pressure difference existing on the respective faces of the shutter, which thus makes the operation extremely easy.

In all cases, nozzle *g* is placed at the end of the cockpit or engine nacelle and it is suitably directed, so that the jet of gas escaping through the nozzle is turned in the direction opposed to the direction of travel of the airplane.

Fig. 5 shows various other adjustment means which can be used either separately or in combination with that above described.

First, the pilot can operate the throttle valve *p* provided on the intake and which may be combined with carburetter *f*. It is also possible to provide a control valve *q* in by pass *b*, so as to create a difference of pressure between the discharge of the compressor and the intake of the gas turbine, which thus produces an unbalance of the power of these two elements and consequently involves the acceleration of the group when valve *q* opens and a slowing down when it closes.

Furthermore, I may place, on the intake of the gas turbine or on the exhaust of engine *a*, a discharge into the atmosphere, *r*, provided with an adjustment valve *s*. When this valve is opened, a portion of the gases is deviated from the turbine, which therefore tends to reduce the speed of the ground and consequently the supercharging of the engine.

In order to avoid completely loss of the gases thus discharged into the atmosphere, when the discharge port is to be opened for a long time, it is possible, either to provide this discharge port with a second reaction nozzle of the same direction as the first one and therefore producing analogous effects, or to return the discharged gases into nozzle *g*, but behind the turbine. The gases can thus expand in said nozzle, adding their propelling effect to that of the gases which have passed through the turbine. This arrangement is the one shown by Fig. 5.

As the efficiency of the reaction turbine is the higher as the velocity of the gases which escape therefrom is closer to the velocity of the movement of the airplane, and as the velocity of the gases is as a rule much higher than that of the airplane, it is advantageous, in order to improve the efficiency, to produce in the reaction nozzle only a relatively small expansion, which, therefore, corresponds to a relatively low drop of temperature of the gases.

As the exhaust gases of the engine are very hot, they carry along with them into the atmosphere a relatively important amount of heat, which is thus lost. In order to recuperate a portion of the power corresponding to this heat, the exhaust gases, upon leaving the gas turbine, may

be mixed with a certain amount of air, previously compressed but which has not flown through the engine. This air is heated by its mixing with the gases, and it expands in the nozzle together with said gases, which improves the propelling effect.

This air may be obtained at the outlet of the supercharging compressor, as shown by Fig. 6. In this embodiment, the compressor is of the axial type, with helicoidal wheels t_1 , t_2 , t_3 and guides u_1 , u_2 , u_3 . The air enters at e , is compressed by the compressor and is collected at the outlet in tore-shaped conduits v which leads it to the intake of engine a . The discharge or exhaust of the engine is connected with the nozzles d of the gas turbine and upon leaving said turbine, the exhaust gases are mixed with the cold air directly discharged by the compressor through conduit w . This mixture of air and gas then expands in nozzle g to produce the propelling effect.

It may be of interest, in order to obtain a good efficiency, to collect the air which is not to flow through the engine at a pressure lower than that necessary for the supercharging of the engine. This results from the fact that, as above stated, the pressure that can be utilized in nozzle g is relatively low. Consequently, when the compressor is of the multi-stage type, it will be advantageous to take the air in question from an intermediate stage. Such an arrangement is shown by Fig. 7. In this embodiment, the compressor is divided into two parts the first of which, x , acts on the whole of the air that is drawn in. This air is subsequently divided into two streams, one of which passes through the second part, y , of the compressor and serves to the supercharging of the engine. The exhaust gases from said engine drive turbine h and, upon leaving said turbine, are mixed with the cold air from compressor stage x , which has flow directly through conduits w . The mixture expands in nozzle g and produces the propelling effect.

When the compressor is of the centrifugal type, with an helicoidal intake wheel, it will be particularly advantageous to take the by-pass air after said wheel, which already supplies a pressure sufficient for the feed of nozzle g .

In view of the difference of output and of pressure that is necessary for the two compression stages x and y , it may be advantageous to constitute them by machines running at different speeds. Fig. 8 shows an arrangement of this kind in which compressor y is driven directly by gas turbine h , for instance through a shaft common to both of them, while compressor x is driven through a gear train z which makes it possible to drive it at a different speed better adapted to the characteristics required therefrom.

The two elements of the compressor might also be driven by means of two gas turbines mounted in series and actuating said compressor elements through concentric shafts, the rotation taking place either in the same direction or in opposite directions.

As the drop of pressure utilized in the reaction nozzle is relatively low, the additional air may also be supplied by the very displacement of the airplane in the atmosphere, without making use of a compressor. The air from the atmosphere enters, owing to its relative velocity, through an inlet orifice e' (Fig. 9) in which a portion of its living force is transformed into pressure. It

mixes with the hot gases coming from the exhaust of the turbine, which rise its temperature; then it expands, together with said gases, in nozzle g .

This produces a positive work, although the expansion is in this case equal only to the relative velocity of the inflowing air, because, in the meantime the air has been heated and the speed it acquires in nozzle g for a given expansion is the higher as its temperature is higher. This arrangement might even be employed in the case of an engine which is not supercharged, in which the heating of the air would be directly produced by mixing with the exhaust gases from the engine.

Of course, the various arrangements above mentioned in which there is provided an air by-pass leading behind the gas turbine can be employed in combination with a thermal engine the supercharging device of which also includes a by-pass connecting the intake and the exhaust of the engine, as shown in dotted lines by way of example in Fig. 1, since, as above set forth, these two by-pass arrangements have different functions which complete each other.

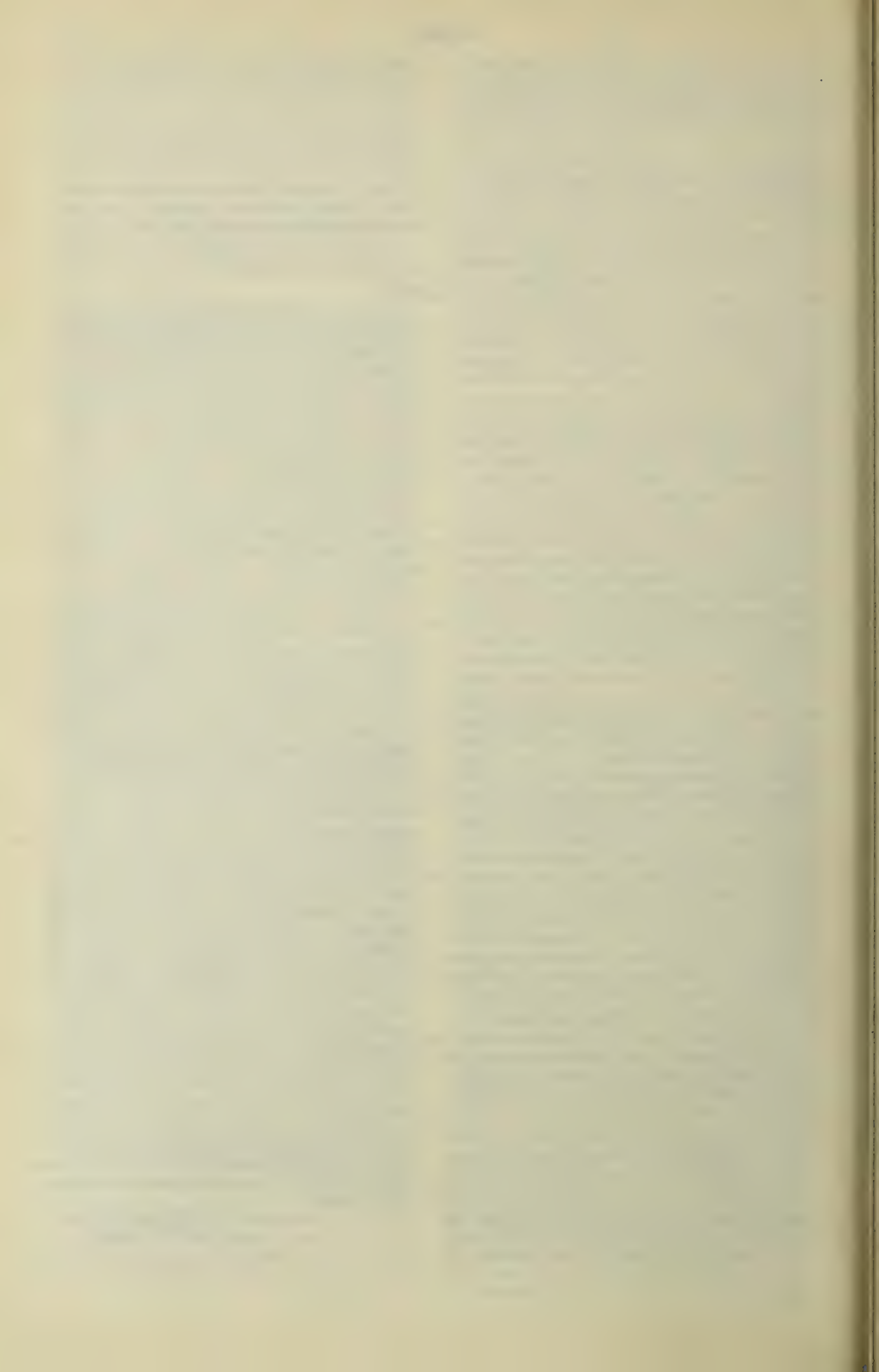
In the various Figs. of the drawings, the compressors are shown now of the axial type, now of the centrifugal type, but it should be well understood that any of the arrangements above described can be applied to compressors of any type whatever, axial, centrifugal, of a combined type or even volumetric.

Likewise, for the sake of simplicity, the exhausts of the engine cylinders have been shown as opening into a single conduit or manifold, but it is clear that, when the number of cylinders of the engine is such that the exhausts interfere with one another, it would be advantageous to separate the exhaust manifold into several parts each of which corresponds to a group of cylinders the exhaust periods of which do not interfere with one another. In this case, the inlet tore-shaped member of the gas turbine will be partitioned into several portions each of which will receive the exhaust of one of these groups of cylinders.

A very interesting arrangement consists, in this case, in partitioning also the exhaust of the gas turbine, and also, eventually, the reaction nozzle. This is due to the fact that, as this nozzle creates a counter-pressure, the exhaust gases from one of the cylinders, if it interfered with the end of the exhaust from another cylinder, would create a counter-pressure in the gas turbine making it impossible suitably to utilize the energy of this exhaust end. Therefore, it will be advantageous to partition both the intake and the exhaust of the gas turbine, as shown by Fig. 10, which shows the development of a portion of the wheel.

In this Fig., the gases arrive through distinct conduits b_1 and b_2 , are fed respectively to corresponding portions of distributing nozzles d_1 and d_2 , drive wheel h and are collected, at the outlet in two chambers w_1 and w_2 , each of which leads to a reaction nozzle g_1 and g_2 , respectively. Of course, the partitions in the reaction nozzle need extend only to a point before the orifice where the gases have already acquired a velocity such, in the direction of the flow, that there is no possibility of creating a counter-pressure in the adjacent conduit.

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APRIL 27, 1943.

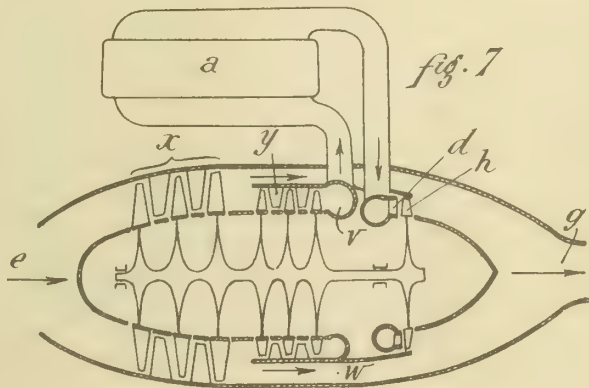
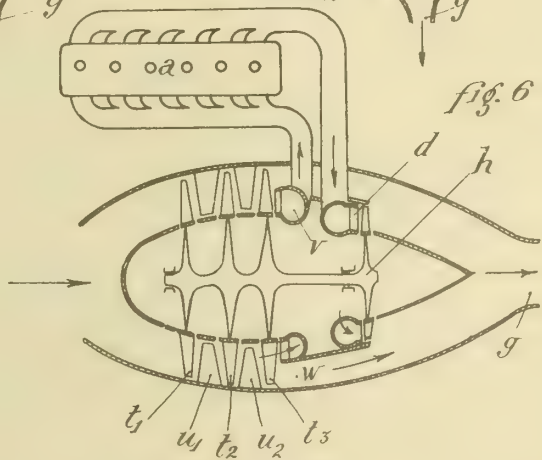
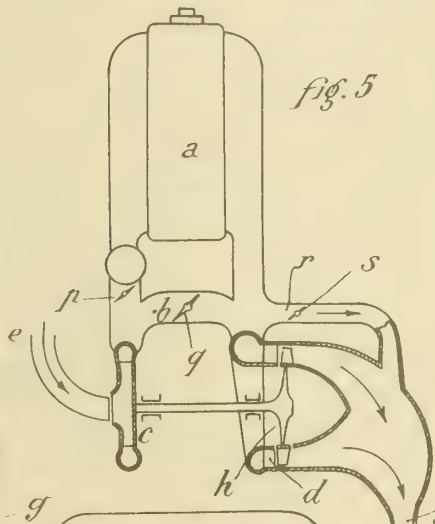
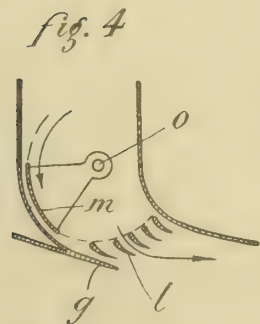
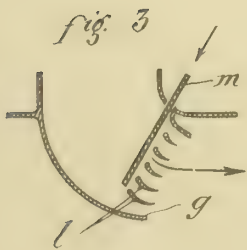
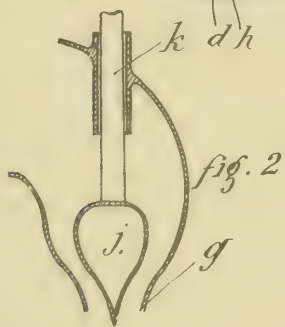
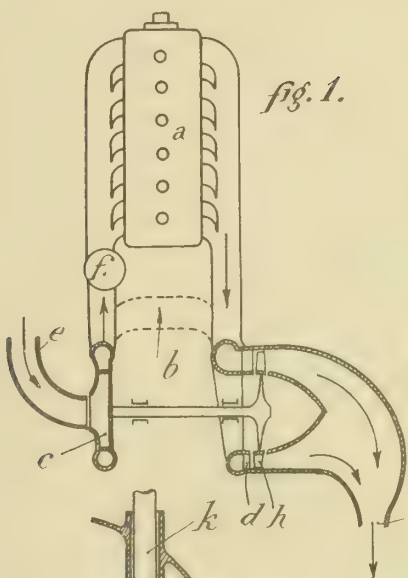
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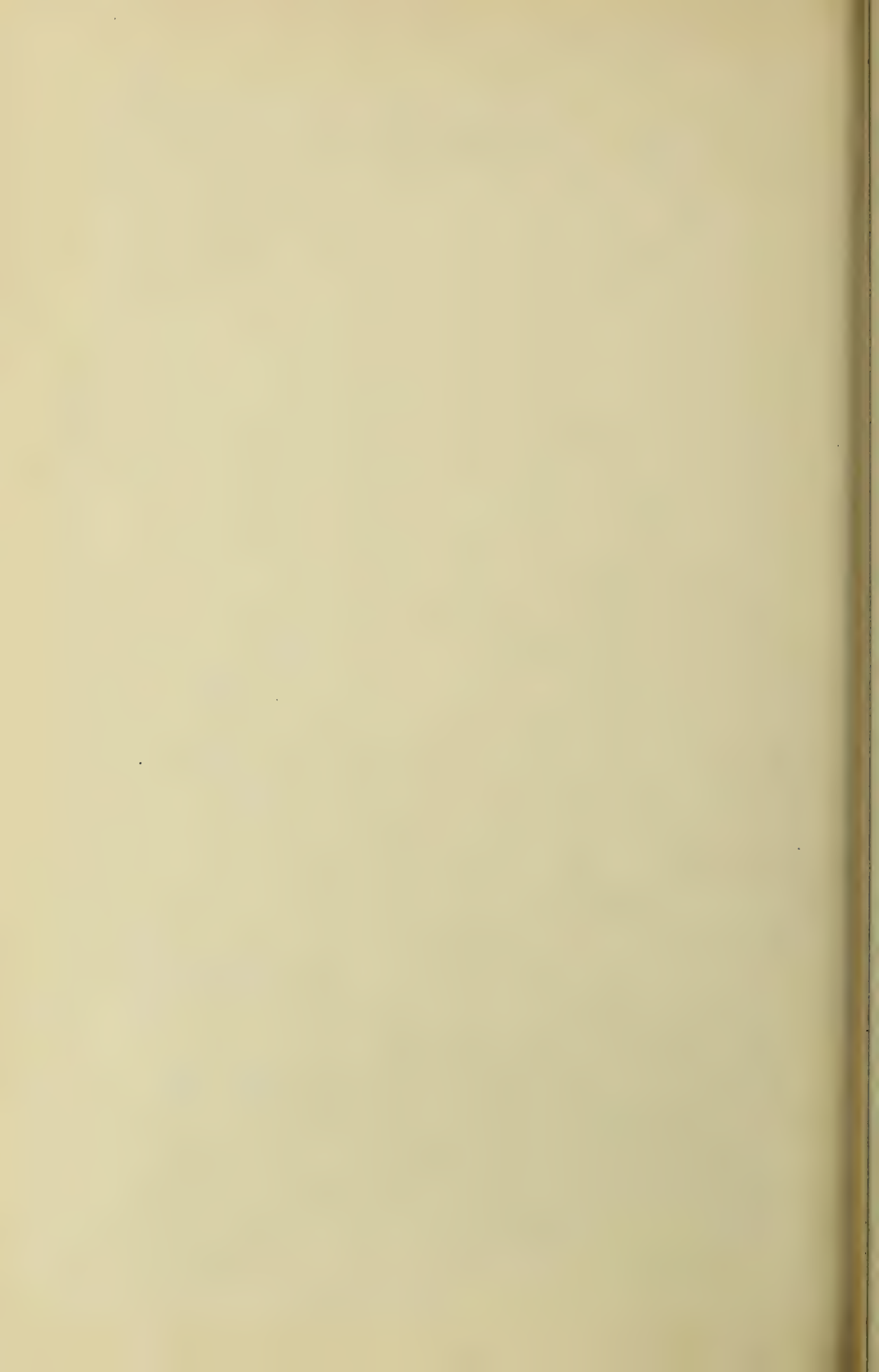
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SUPERCHARGED ENGINE
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2 Sheets-Sheet 1



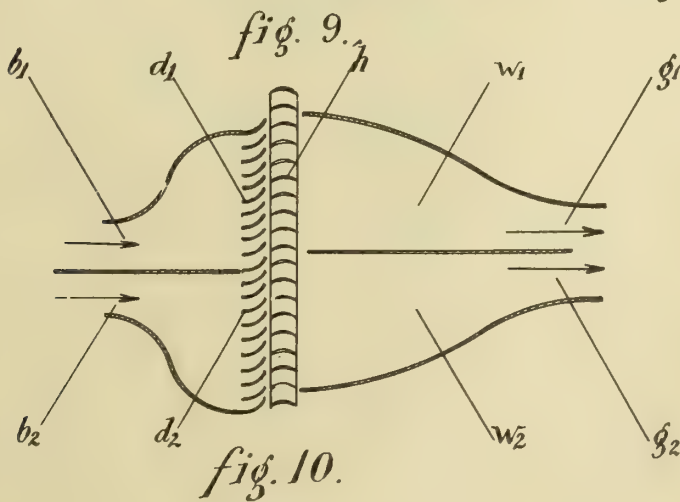
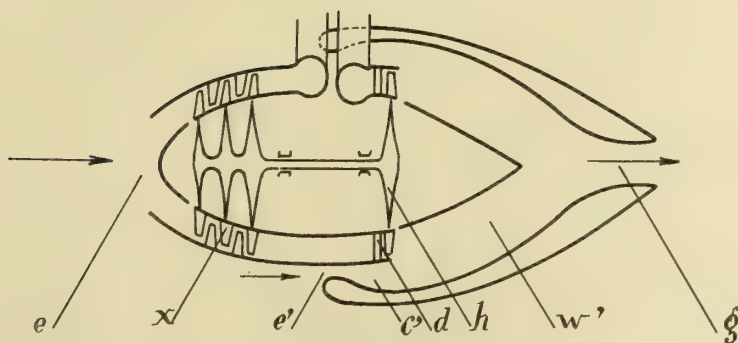
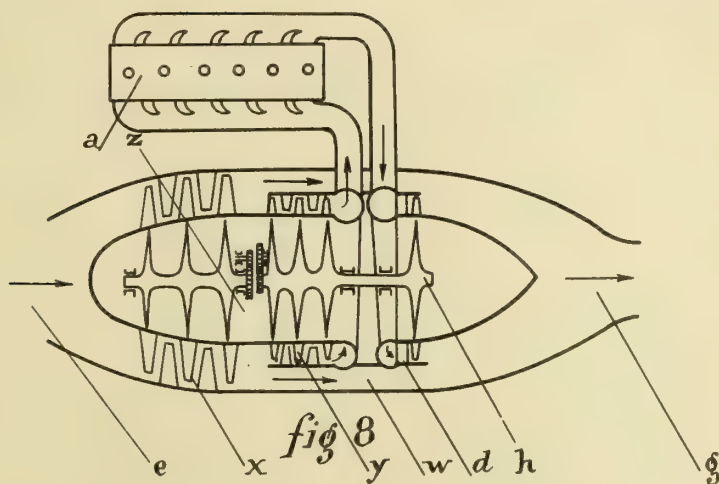


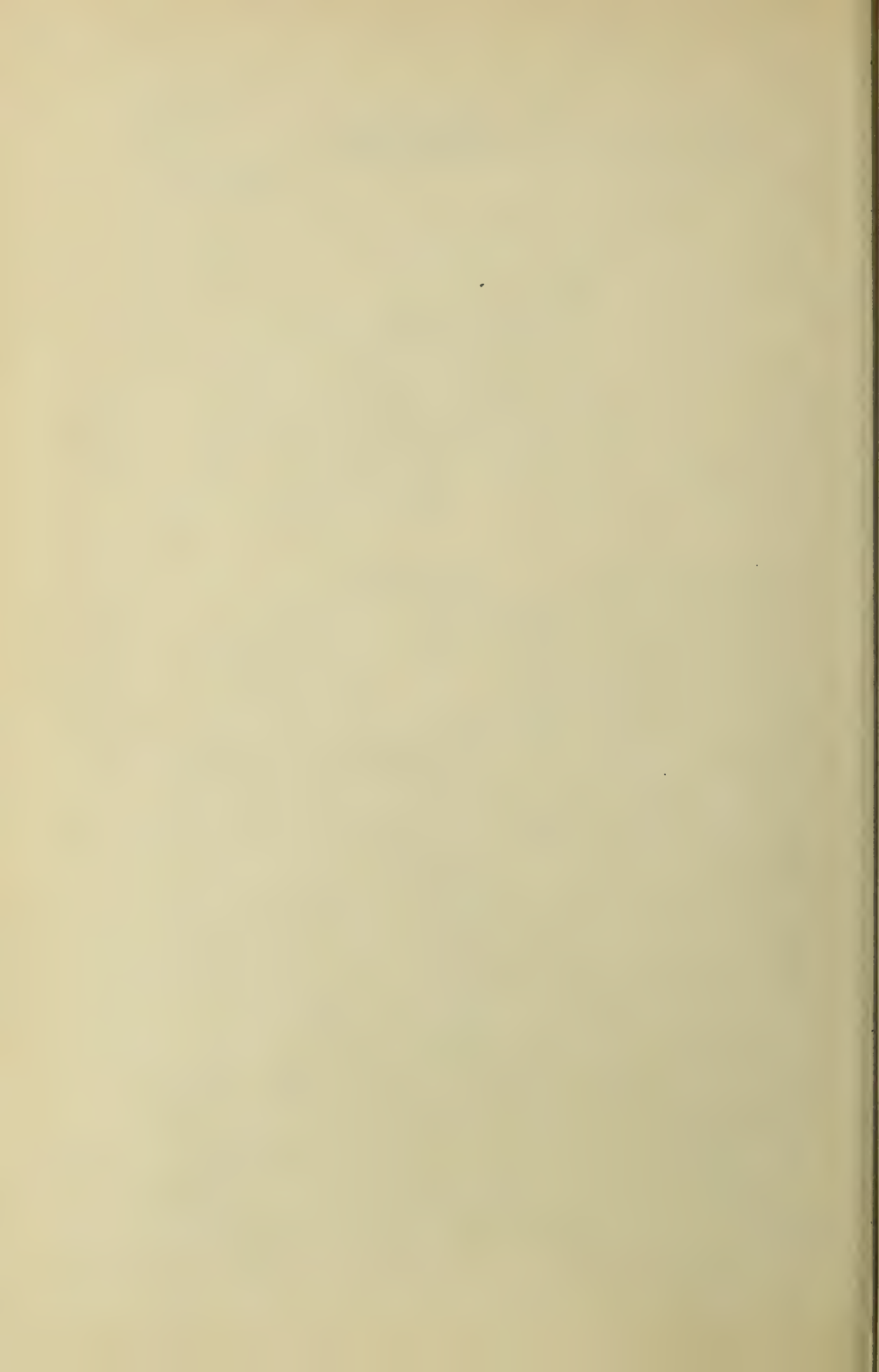
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ALIEN PROPERTY CUSTODIAN

PROCESS AND APPARATUS FOR THE STARTING AND FOR THE OPERATION ON PART LOAD OF ROTARY ENGINES, MAINLY GAS TURBINES

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Application filed November 29, 1940

Turbines and rotary compressors in which the working fluid suffers a change of volume of a certain magnitude are generally of such design as to ensure that it should be at certain definite figures of the change of volume, or, in other words at certain definite figures of the speed of flow varying in dependence on the change of volume that the turbines and rotary compressors operate correctly and at high efficiencies. Accordingly, conditions of operation in which (as e.g. at starting, or during operation at reduced speeds or at reduced load) the working fluid will not suffer the change of volume or change of speed corresponding to normal conditions, will cause the efficiency of the machines in question to become reduced. This circumstance may in certain cases, e. g. when a gas turbine set composed of a gas turbine and a compressor and designed for a fairly substantial compression pressure has to be set to work, lead to very troublesome consequences. In the case of such machines starting is performed in such a manner that the set is rotated by means of an external source of power until it reaches a speed at which it is already able to continue its acceleration by its own power. If, however, the efficiencies at which the compressor and the turbine operate during the process of starting are low, this will result, on the one hand, in a very substantial increase of the power requirements of the starting machine, and, on the other hand, in the fact that it will be only at a much higher speed that the condition in which the set is already able to continue its acceleration by its own power will be reached.

The process and apparatus according to the invention enables this drawback to be eliminated by an arrangement in which, when starting rotary compressors, turbines or sets of machinery composed of such machines, or operating them at part load (at part speed), a portion of suitable magnitude of the working fluid is passed through bleeding and/or by-pass lines in such a manner as to ensure that the weight of working fluid flowing per unit of time through the high-pressure stages of the turbine should be lower than the weight of working fluid flowing per unit of time through the low-pressure stages, and that owing to the corresponding variation of the through-flow speeds, the actual flow speeds resulting in the various pressure stages should be shifted, as closely as possible, towards those figures of speed characteristic for the design of the machine or set of machinery, as will enable the most advantageous efficiency to be obtained.

An embodiment exemplifying the apparatus suitable for carrying the process into effect is shown in longitudinal section on Fig. 1. On Fig. 2 another embodiment, shown by way of example, is shown in front elevation, whilst Fig 3 is an elevation, and partly a longitudinal section, of a further variant of construction, equipped with a heat exchanger.

According to Fig. 1, the compressor rotor 4, rotatable by means of the shaft 3 journalled in the bearings 2, 2', is arranged in the compressor casing 1. The rotating blade rings 5 mounted into the rotor 4 are arranged between the stationary blade rings 6. To the compressor casing there join on, at the ends of the rotor, on the one hand the inlet branch 7 and on the other hand the outlet branch 8. To the shaft 3 of the compressor there is coupled the shaft 9 of the turbine, carrying the turbine rotor 11 arranged in the turbine casing 10. The turbine rotor is equipped with the rotary blading 12, whereas the stationary blades 13 are mounted into the turbine casing 10. The turbine shaft 9 is journalled in the bearings 14, 14'. The inlet branch 15 of the turbine communicates with the outlet branch 8 of the compressor through the combustion space 17 fed by the burner 16. At that end of the turbine rotor which is opposite to the inlet the discharge branch 18 of the turbine joins on to the turbine casing. Joining on to the working space of the turbine the bleeding or by-pass lines 19 and 20 are arranged, which, through the apertures 21 and 22, respectively, are communicating with the working space of the compressor; these by-pass lines are, through the apertures 24 and 25, respectively, communicating also with the working space of the turbine. The pipe-lines are equipped with the closing or throttling members 26 and 27 suitable for closing or only throttling their cross-section. The by-pass line 20 moreover also communicates with the auxiliary combustion space 29 fed by the burner 28.

The method of operation of this equipment is the following: If the rotors rotate, the compressor draws-in working fluid (air) through the inlet branch 7, compresses it and drives it through the outlet branch 8 into the combustion space 17, in which the air becomes heated owing to the combustion of the fuel introduced by means of the burner 16. From here the working fluid passes into the working space of the turbine, in which it expands down to a certain lower figure of pressure, following which it leaves the turbine through the discharge branch 18. The work produced by the apparatus can be taken off either from the



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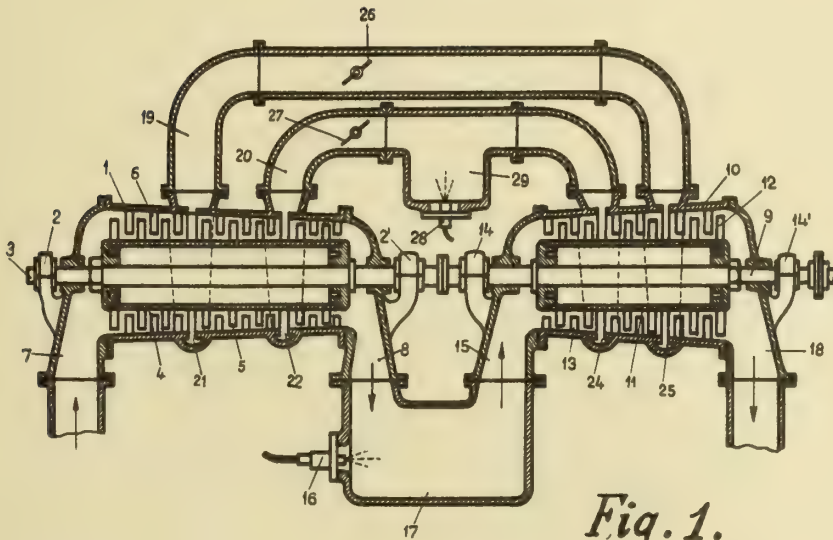


Fig. 1.

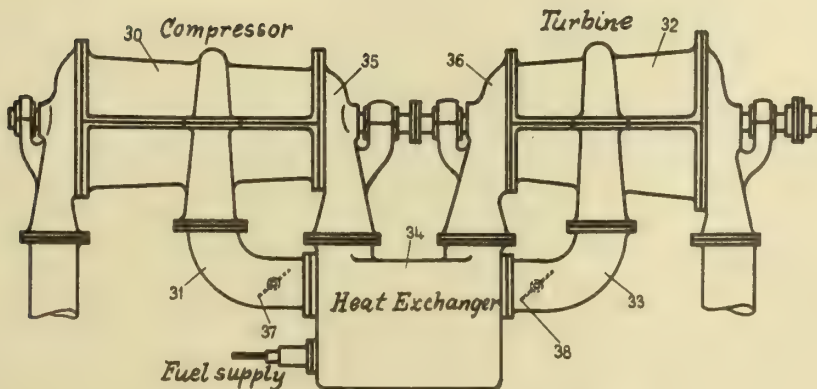
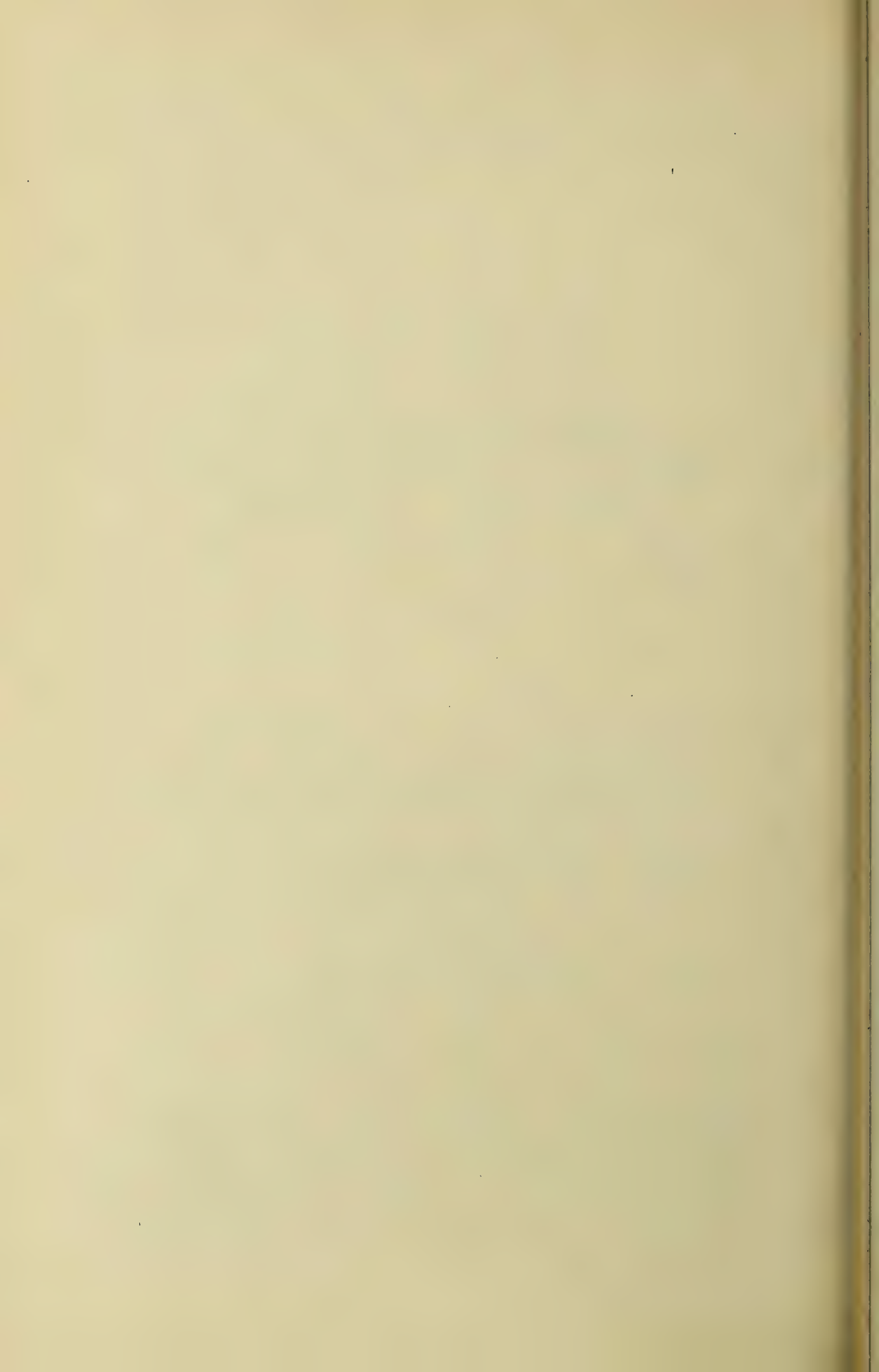


Fig. 2.

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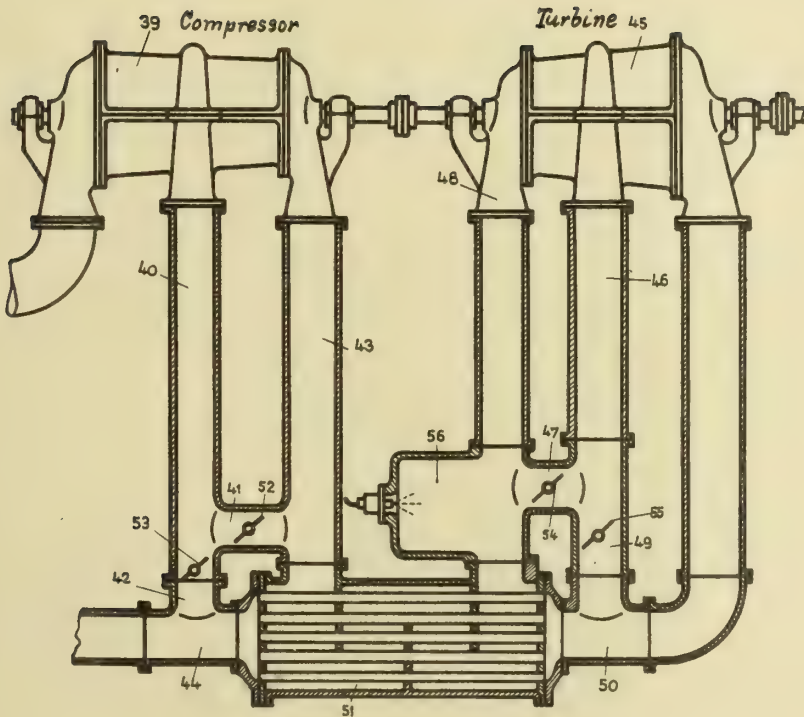


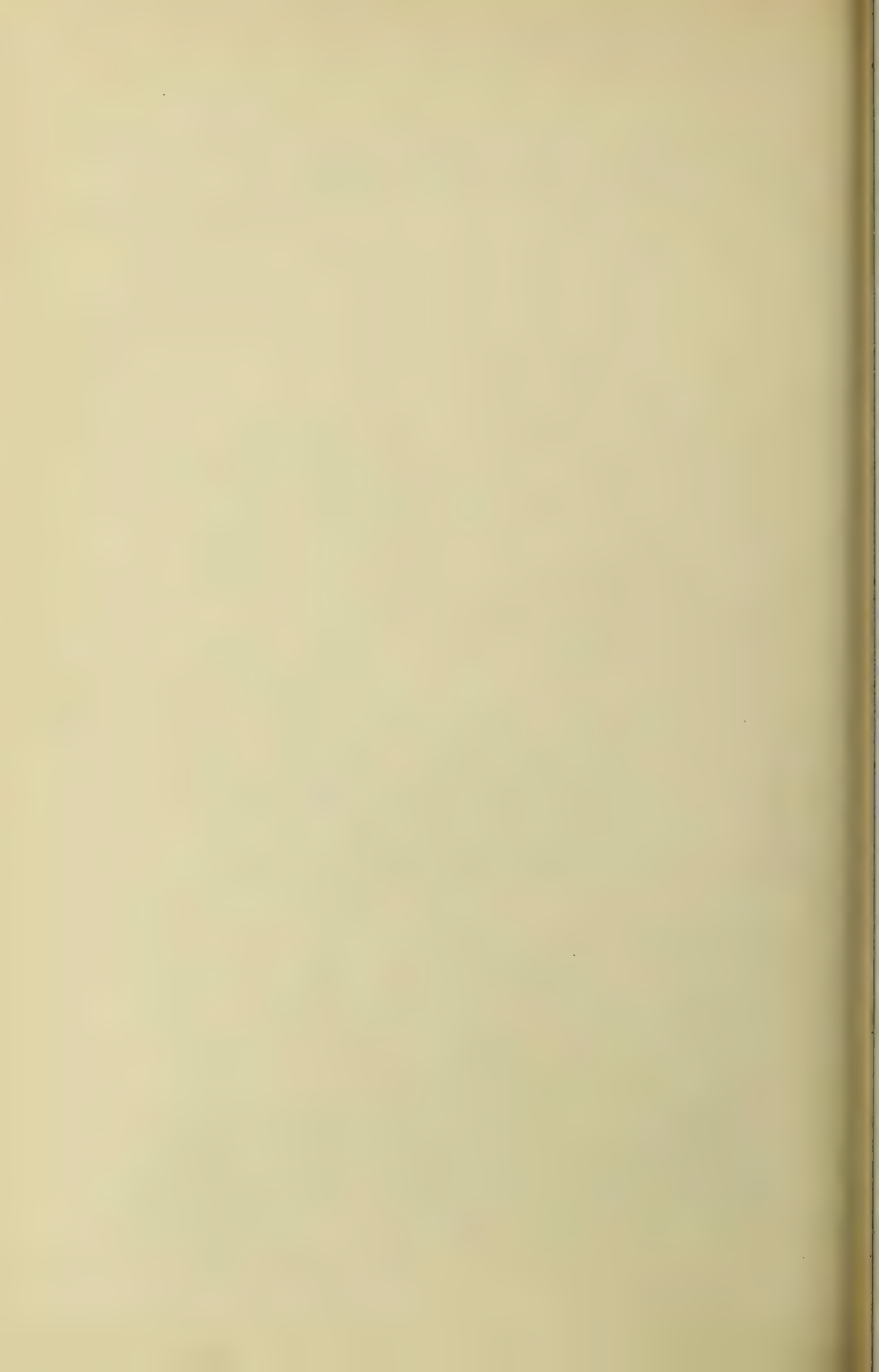
Fig. 3.

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ALIEN PROPERTY CUSTODIAN

DOUBLE WALLED BATHING CAP

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the Alien Property Custodian

Application filed November 30, 1940

The present invention relates to a bathing cap and more particularly to a double walled and inflatable cap.

It is an object of this invention to provide a bathing cap, preferably of rubber or other elastic material as latex, rubberized and extensible fabrics, etc., so that it can be inflated to thus use such cap in its inflated condition as a cushion, a pillow or head rest. It is thus a further object to form the double walled cap in such a way that when it is inflated to be used as a head rest it will not be egg or ball shaped, but will have a suitable depression therein in each side thereof to accommodate the head of the user. For this purpose it is an object of the invention to interconnect the two walls of the cap together at approximate central and opposite points so that the cap will present the appearance of a ring or "doughnut" without any central opening or passage.

Therefore the important feature of the present invention is to provide a completely double walled bathing cap, with or without the usual flaps for fastening the cap to the head of the wearer, and in which the approximate center point of the opposite walls or the approximate top of the cap is interconnected so that when the cap is inflated with air, when not in use as a cap, the latter can be used as a head rest in that the cap then assumes a ring-shaped configuration having an inflated circular cell with an interconnected center part.

Further objects will be apparent from the following description taken in connection with the accompanying drawing in which:

Figure 1 is a vertical sectional view of the bathing cap in deflated condition as the cap is used for bathing, and

Fig. 2 is a similar sectional view showing the cap inflated to be used as a head rest.

The cap consists of an outer wall or layer 1 having a pair of securing flaps 2 which latter may, however, be omitted if desired. Only one flap 2 is shown but the other flap is on the opposite side as is well known. An inner wall or layer 3 may be integral with the wall 1 or it may be a separate section suitably secured to the wall 1. In the example illustrated the inner layer 3 is secured by its peripheral bent-over edge 3', Fig. 1, secured to the layer 1 so that the two layers 1 and

3 are in air tight connection with each other. In case rubber is used for the layers 1 and 3 the edge or section 3' of the layer 3 is secured to the layer 1 by the use of a suitable adhesive or by vulcanization. The edge 3', forming the securing section for the two layers 1 and 3, is thus provided along the edge or rim of the bathing cap and this edge 3' forms a circle or an oval. Obviously the best over edge 3', Fig. 1, could be omitted in which case the walls 1 and 3 would be directly interconnected together in an air-tight manner.

The walls or layers 1 and 3 are also interconnected at approximately central points which can be designated as a central interconnected section 4. This section 4 may be suitably formed by vulcanization or an adhesive can be used or the two layers may be simply stitched or sewed together. This section 4 is provided at an approximate equal distance from the edge 3'.

The outer wall or layer 1 may be provided with a small projection or rubber tube, now shown, with which the cap may be inflated to the configuration shown in Fig. 2, and this projection or tube may be provided with a self-closing valve, not shown, or merely a stopper may be used, all of which are well known. Also any other suitable means can be used to inflate and deflate the cap when desired.

If air is to be blown into the space a, Fig. 1, then the cap will assume the configuration shown in Fig. 2 in which the space a in cross section becomes somewhat "balloon" shaped. From Fig. 2 it will be apparent that the inflated cap is provided with two parallel and circular flat surfaces 5 and 6 so that the pillow or head rest will provide a firm or stationary support for the head when the pillow is placed on the sand, ground or any other location. It is of course obvious that more than one interconnecting section 4 can be provided if such a structure is desired which is considered within the scope of the present invention.

The combination bathing cap and head rest is preferably made of rubber but of course any other suitable material can be used which should preferably be elastic.

EUGEN BEZNER.

THE HISTORY OF THE UNITED STATES

OF THE
NORTH AMERICAN CONTINENT
FROM THE FIRST DISCOVERY
TO THE PRESENT TIME

The history of the United States is a story of discovery, exploration, and the struggle for freedom. It begins with the first European settlers who came to the New World in search of wealth and a new life. They found a land of vast resources and a people who had lived there for centuries. The story of the United States is a story of the people who have lived here, of their struggles, their triumphs, and their dreams. It is a story of a nation that has grown from a small colony to a great power, a nation that has shaped the world and been shaped by it. The history of the United States is a story of the American spirit, of the belief in a better life, of the pursuit of happiness. It is a story that has inspired millions of people around the world, a story that has shown us the power of hope and the strength of a united people. The history of the United States is a story that is still being written, a story that is full of promise and possibility. It is a story that we all share, a story that is part of our common heritage. The history of the United States is a story that is worth knowing, a story that is worth remembering. It is a story that is part of our lives, a story that is part of our future. The history of the United States is a story that is still being written, a story that is full of promise and possibility. It is a story that we all share, a story that is part of our common heritage. The history of the United States is a story that is worth knowing, a story that is worth remembering. It is a story that is part of our lives, a story that is part of our future.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

E. BEZNER
DOUBLE WALLED BATHING CAP
Filed Nov. 30, 1940

Serial No.
368,083

Fig. 1.

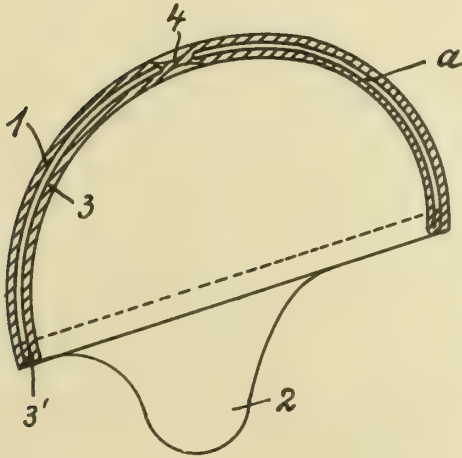
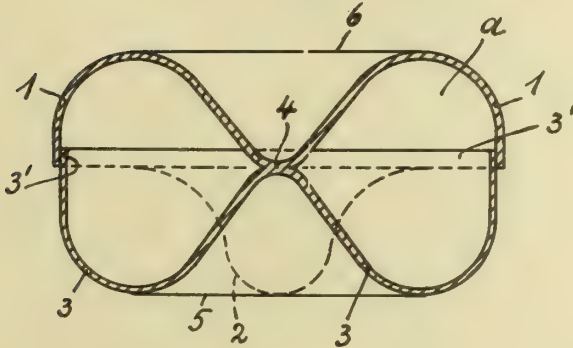


Fig. 2.



Inventor:
Eugen Bezner
By
Young, Emery & Thompson
Attorneys

ALIEN PROPERTY CUSTODIAN

POWER PLANTS IN MOTOR VEHICLES INCLUDING AN INTERNAL COMBUSTION ENGINE WITH HYDRAULIC GEAR

Karl Maybach, Friedrichshafen, Bodensee, Germany; vested in the Alien Property Custodian

No Drawing. Application filed December 2, 1940

My invention relates to power plants in motor vehicles comprising an internal combustion engine provided with a hydraulic gear. It has special reference to heavy vehicles such as railroad motor cars.

In vehicles of this kind it is advantageous to make use of a hydraulic transmission including one or several hydraulic gears such as turbines for converting the turning moment because of their automatic adjustment of the transmission ratio between the primary and secondary turning moments in dependence on the vehicle speed and because of the driving force being not interrupted. But the hydraulic transmission, just as the electric transmission, as compared with the plain mechanical transmission is connected with the disadvantage of considerable loss in performance because the highest attainable hydraulic efficiency amounts to about 85 per cent. Furthermore, the curve of efficiency of a hydraulic transmission used for such purposes from its highest value declines on both sides, more or less.

That is why hydraulic transmissions were used only for starting and over certain spheres of revolutions, whereas in addition a mere mechanical transmission was provided for the highest speed for example and for certain speeds frequently used. Thus it becomes possible to attain a good efficiency on certain spheres of speed by means of the mechanical transmission which has not much loss when the hydraulic device is shut off. But such an arrangement has again several other disadvantages. In some spheres of the vehicle speed the output of the engine is not utilized to its utmost because of the unfavourable hydraulic efficiency, while in others the adaptability of the turning moment is missing owned by the hydraulic transmission.

Object of the present invention is the elimination of these disadvantages and the compensation for the loss in performance because of the low efficiency of the hydraulic transmission, so that a highly increased utilization of the motor output is attained, as compared to the former power plants.

With the engines used so far, especially with carburetor engines, the curve representing the out-going performance is more or less bent in relation to the axis of abscissas on which the number of revolutions is marked and it reaches a vertex at a certain number of revolutions which is close to the maximum number of revolutions. The turning moment reaches its maximum for example at about 60 per cent of the maximum number of revolutions. This has its reason in that the cross section of the fuel admission inside

the motor must not exceed a certain area so as to avoid precipitations in the carburetor and in the intake which may occur because of the fuel mixture and the vaporization having low speed at low numbers of revolutions at which a high turning moment is wanted when working with the mechanical transmission, which might lead to disturbances and loss in performance. On the other hand when the carburetor is fully opened at a medium number of revolutions the motor tends to knock. Above the number of revolutions corresponding to the maximum turning moment the performance of the motor is considerably lower than it might be with larger cross sections, but these cross sections had to be chosen smaller with regard to good working at lower numbers of revolution. Furthermore, the compression ratio has to be chosen so low that a good running of the motor at low numbers of revolutions and with full opening of the carburetor is attained. That is why at low numbers of revolutions the full motor performance which might possibly be reached is not attained, so that the motor is reduced in its efficiency.

The invention is based on the following perceptions: The relations between the secondary number of revolutions to the secondary turning moment of the hydraulic transmission (for example turbine converter) is about cubical, therefore it is not necessary to choose dimensions for the motor aiming at a good running at low numbers of revolutions.

According to the invention the engine is provided with a fuel admission or charge of greater volume than usual and furthermore, the compression ratio is also increased. Each of these features causes an increase in performance by which the loss from the hydraulic gear is substantially compensated or even exceeded.

The larger fuel admission may be reached on different known ways, for example by feeding a larger amount of fuel or by increasing the cross sections of the fuel leadings concerned (carburetor, intake and valves). Thus no essential losses will occur up to the highest possible performance, as compared to the theoretically possible best fuel admission, especially throttling losses are avoided. Besides, the admission may still be increased by adequate supercharging at the higher numbers of revolutions.

The compression ratio should be chosen as high as possible with regard to the highest numbers of revolutions without taking into consideration the running at low numbers and high performance.

The invention allows for an increase in highest performance with gasoline motors without supercharging up to 30 per cent as compared to motors having the normal curve. This curve of performance which is normally of hollow shape towards the axis of abscissas is changed approximately to a straight line and when supercharging is applied changes into a curve vaulted in the direction towards the axis of abscissas.

It becomes possible by the invention to make better use of the working features of the hydraulic transmission because of the higher performance and also favourable features of the vehicle equipped with such transmission are gained, as for instance: great acceleration and low fuel consumption.

With motors which are not provided with throttling regulating means as of gasoline motors but with other regulating means the increase in performance attainable with a power plant according to the invention may be a little lower; but also with such motors performances are reached which make the use of power plants with hydraulic transmission possible and economical. The transmission may include several hydraulic gears or for instance a change speed gear in addition to an hydraulic gear.

I do not want to be limited to the details described as many variations will occur by those skilled in the art.

KARL MAYBACH.

ALIEN PROPERTY CUSTODIAN

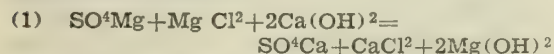
PROCESS FOR EXTRACTING MAGNESIA FROM AQUEOUS SOLUTIONS CONTAINING CONVERTIBLE MAGNESIUM SALTS, SUCH AS SEA-WATER, ETC.

Jean Charles Séailles, Paris, France; vested in the
Alien Property Custodian

No Drawing. Application filed December 4, 1940

This invention relates to an improved process for extracting Magnesia from aqueous solutions containing Magnesium Salts convertible by lime such as sea-water, natural or artificial brines, etc.

Generally milk lime is used according to the well-known reaction.



Milks of calcined dolomites containing caustic lime have been used to the same purpose.

Unhappily, the reaction (1) with milk necessitates expensive working as magnesia is recovered in the form of precipitates which are very voluminous, difficult to filter and to wash and which retain very large quantities of water.

It has been found that by using lime water which is a liquid and very diluted reagent very good results are obtained when the reaction is carried under the following conditions:

Mixing lime-water with the magnesium brine, separating the precipitate which is formed and continuously reinjecting the precipitate from one operation in the reaction liquids used for the next operation so as to obtain finally, after a number of successive operations a heavy precipitate easily recovered, filtered and washed.

This lime-water process has only one drawback, it requires the manipulation of large volumes of liquids and therefore large equipments.

I have now found that, if operations are properly carried out, it is possible to obtain precipitates of a quality equivalent to the precipitates obtained from lime-water, by using instead of a liquid reagent such as lime-water reagents such as milk of lime or milk of calcined dolomite more or less diluted so that the reaction takes place between the magnesium salt solution and solid particles kept in liquid suspension. The result is that the volumes of liquids to handle and the volumes of equipment are considerably reduced.

For instance, the extraction of Magnesia from sea-water will require for one ton of MgO the manipulation of about five hundred cubic meters of sea-water and about fourteen hundred cubic meters of lime-water. In my improved process, the volume of sea-water is of course not altered but for the suspension of lime in water I can use a very small volume of water.

This quantity varies according to the ways and means employed to work out my invention which will be explained later on but it can be reduced eventually just to the quantity necessary for making the milk of lime or the milk of dolomite i. e.

well under fifteen cubic meters for one ton of magnesia.

The fact that these results can be obtained by substitution of a solid suspension for a liquid reagent is rather surprising because the conditions of reaction and pH during the reaction are not the same in the two cases.

In carrying out the invention the following steps are used:

(I) Making a milk from the reagent (calcined lime, calcined dolomite, etc.). At this step heavy impurities such as unburnt or overburnt stones are easily disposed of.

(II) Making from the milk a suspension of solid particles in diluting liquid. At this step, smaller impurities may be eliminated.

(III) Mixing the magnesium salts solution with the suspension from step II together with previously formed precipitate of magnesia so that precipitation from the new reaction will always be realised in the presence of agitated seeding products regularly sent back to be fed by new reactions until proper physical qualities of the final precipitate are obtained.

(IV) Separating the precipitates from the mother liquids and sending back the separated precipitate in III until proper qualities are obtained.

In this step IV, I may work on the discontinuous principle and recover the precipitates in batch operations but it is better to work in a regular continuous circuit. In this case, when the precipitate has reached the required physical qualities (density, filtrability, washability, etc.), only a part of the precipitate is sent back to reaction and the rest is drawn out for utilisation.

Step I.—This does not require special explanation as it is a usual and well-known industrial operation it requires a very small amount of water which may be any of the three qualities mentioned for use as diluting liquid in Step II hereunder. At this step heavy impurities are better sieved out or otherwise disposed of.

Step II.—At this step we have to consider: (a) The separation of smaller impurities; (b) The diluting liquid; (c) The diluting operation.

(a) is usually simply carried by a rough decantation whereby heavier and coarser particles are eliminated. Any equivalent means can be employed for instance a Sieve, etc.

(b) for diluting water, I may employ either fresh water, or the residual exhaust water from the process but I find more advantageous to use as diluting liquid a portion of the liquid resulting from reaction in Step III and still containing the

precipitate which has been formed during said reaction. By using the reaction liquid sent back from Step III to Step II, the real consumption of diluting liquid is reduced to losses and the cost is reduced to merely small pumping expenses as this reaction liquid is utilised without any sort of preparation or treatment. Further it acts as a seed and facilitates the precipitation of dense material.

(c) The diluting operation is very simple; it may be carried in any mixing tank provided with proper mixing devices. It will be advantageous to provide means to separate at this step small but heavy impurities which will have escaped the treatment in step I.

Step III.—This step is better carried out in a reaction tank where the magnesium brine is mixed with the diluted reagent from Step II and with precipitate sent back from Step IV. This precipitate may be admitted in the reaction tank either separately or mixed with the magnesium brine. I generally prefer to mix it with the diluted reagent before admission in the tank.

The reaction tank may be a simple tank provided with proper mixing devices (specially in case of batch operation). For continuous work I generally prefer to use a reaction tank in the shape of a longitudinal channel provided with mixing devices where I admit first the diluted reagent together with the seeding precipitate at one end and where I inject progressively the magnesium brine in due proportion, the speed of travel of the products from one end to the other being so regulated that reaction is practically finished during the time taken by the liquid to reach the exhaust.

Step IV.—This step may be carried by any device able to separate the precipitate from the mother-lye. I generally prefer to use a decanting tank.

From this separating device, the precipitate is sent back to Step III until by working again and again new reactions in the presence of the precipitates from previous reactions the desired physical qualities are obtained; when the precipitate is recovered and operations started again.

In continuous work the precipitate is sent back as a whole until proper qualities are obtained and thereafter a proper portion of the precipitate may be regularly drawn out and disposed of whilst the rest goes back as a seed in Step III.

The relative volume proportions of the different tanks for operating the process will be easily determined by small scale tests.

As an example the following proportions have given very good results, starting from sea-water and lime milk. The figures refer to a production of one ton MgO per hour recovered as $Mg(OH)_2$:

(1°) Proportion of reagents:

Sea-water per hour—cubic meters— 500
CaO (plus impurities and insolubles) —————kilogs— 1400

(2°) Volume of diluting tank—cubic meters— 500

The mixture of milk and diluting liquid (which was taken back from the reaction tank without separating the precipitate) was agitated and passed through the tank in 10 to 15 minutes. The volume of diluting liquid was 2000 to 3000 cubic meters per hour.

(3°) Volume of reaction tank—cubic meters— 150

(4°) Surface of decanting tank—
—————cubic meters— 1000 to 1500

Another advantageous way of carrying out the invention consists with using a series of tanks through which the products flow progressively.

In the first tank the milk of reagent and the seeding precipitate from the decanting apparatus are admitted and mixed together with a proportion of the liquid from the last tank of the series, in the following tanks the magnesium brine is admitted in fractions. Agitation is carried out in each tank. The overflow from the last tank goes to decantation wherefrom, when the "regime" is reached, a proportion of precipitate is sent back to the first tank and the surplus disposed of for recovering the precipitate to be disposed of. In this form of working the proportion of diluting liquid may be reduced on condition that effective agitation is provided and sufficient time is allowed for the reaction to be practically finished in the last tank.

Of course, these successive tanks may be replaced by any equivalent apparatus such as a channel-tank provided with proper means to insure the desired successive flow, mixtures and agitation all along the channel.

JEAN CHARLES SÉAILLES.

ALIEN PROPERTY CUSTODIAN

PRODUCING THREADS AND THE LIKE FROM VISCOSE

Jürenus Harms, Berlin-Wilmersdorf, Germany;
vested in the Alien Property Custodian

No Drawing. Application filed December 6, 1940

The present invention relates to a method of producing threads, tapes or ribbons and the like from viscose.

Numerous methods have been proposed to increase the strength of artificial threads obtained from cellulose and cellulose derivatives by subjecting them to a suitable kind of stretching.

So for instance, in a method proposed by Ernst in the year 1905 the thread spun in accordance with the viscose method had already been stretched by guiding same, between the bath and the winding member, over glass rods of circular cross section and so subjecting the thread to a gradually increasing tension. Later on various methods have been proposed according to which this stretching is carried out in a more definite manner for instance by guiding the thread, after leaving the precipitation bath, over two or more rolls rotating one after another with always increasing circumferential velocity.

When carrying out the above mentioned methods it is of great importance that, in the moment of stretching, the thread is not yet in its final condition but in a plastic state. This feature has particularly been mentioned in the various Lilienfeld-Patents according to which strong sulphuric acid serves as plastifying bath in which a particularly effective stretching may be carried out.

The further development in the field of extremely strong fibres then is directed to the fact that the stretching is no longer to be carried out in air but in other suitable media. So for instance in the viscose field various methods have become known according to which the thread not yet or not yet completely decomposed to cellulose hydrate is subjected to baths, for instance hot water, salt solutions, acids, alkalines or organic reagents, and subjected therein to a stretching as high as possible.

The common feature of all the above mentioned methods is the fact that before the indicated special stretching measures the thread being formed is already strongly stretched in the spinning bath. The acceleration of the thread effected in the spinning bath by drawing beyond the discharge velocity of the viscose or coagulate

is characteristic for all methods from the very start of the artificial fibre industry until to-day.

Now, it is a well known fact that as a rule with all stretching methods mentioned above an increase of the strength of the thread is accompanied by a rather strong, undesired reduction of the stretchability. With a relatively slight stretching and a correspondingly low strength, therefore, the minimum of the stretchability absolutely necessary for useful threads of fibres is obtained already. A further increase in strength at the sacrifice of stretching has often already lead to textiles which, it is true, are tear-proof but have not stand the test.

Now, it has been found that threads of special good qualities of use having a high strength and an excellent stretchability are obtained, if the viscose is spun into a coagulatively acting precipitation bath then, contrary to the hitherto known methods, the product so formed is guided through the coagulating bath with the same speed with which it was introduced into the same and that, moreover, after leaving the precipitation bath is subjected to a stretching for instance between rolls in suitable media. The viscose, without being drawn off from the nozzle, may also be pressed into the precipitation bath and the coagulate formed is collected for a certain time in the precipitation bath and after complete coagulation is supplied to the stretching members. Instead of rolls any other stretching device may be used.

As precipitation bath solutions of any salt coagulatively acting upon viscose, for instance ammonium sulphate, ammonium chloride, sulphate of sodium, sulphate of magnesium and so on may be used alone or in combination with each other, eventually also in the presence of small amounts of acids.

As bath for effecting the stretching all hitherto used media may be employed and the stretching may also be carried out in gaseous media. The decomposition of the product to cellulose hydrate may take place during or after the stretching operation or in the last phase or state of the latter.

JÜRENUS HARMS.



ALIEN PROPERTY CUSTODIAN

INVISIBLE HINGE FOR FURNITURE, DOORS, WINDOWS, ETC.

Livio Cencioni, Rome, Italy; vested in the Alien Property Custodian

Application filed December 6, 1940

The movement of two parts connected by a hinge is a rotating motion about the hinge pin, which, in order to enable this movement to take place, must be situated outside the two parts or at least very near their juncture. In other words it is impossible to fit the hinge wings into the two parts because such an arrangement would produce a contrast between the two parts at the moment of the rotating motion and accordingly the opening movement would not be able to take place.

My invention relates to a hinge which solves the problem of pin's invisibility of substituting the simple rotating motion of the two parts with another movement consisting in a translating and rotating motion. Said motion separates the two parts during the opening, thus avoiding that contrast which would render the opening action impossible.

Two structures for carrying out my invention are disclosed in the accompanying drawings.

Figs. 1a and 1b show the diagrammatical operation of the embodiment for opening angles up to 90°.

Figs. 2a and 2b show the diagrammatical operation of the embodiment for opening angles up to 180°.

Fig. 3 shows a prospective view of the invisible hinge for opening angles up to 90°.

Fig. 4 shows the invisible hinge for opening angles up to 90° fitted on two parts to be hinged and closed.

Fig. 5 shows the invisible hinge for opening angles up to 90° fitted on the two parts to be hinged and opened.

Fig. 6 shows a prospective view of the invisible hinge for opening angles up to 180°.

Fig. 7 shows the invisible hinge for opening angles up to 180° opened and fitted on two parts to be hinged.

Fig. 8 shows the invisible hinge fitted on two parts to be hinged and closed.

The diagrammatical operation of the structure for opening angles up to 90° is that of an articulated parallelogram with bars exactly dimensioned in their length and two of them, 1 and 3 (Figs. 1a and 1b) are connected to the two parts to be hinged.

When the bars assume the positions as in Fig. 1a the hinge is opened and the two parts to be hinged are at an angle of 90°; when the part connected to bar 3 begins its shutting movement, the

ends M and N of bar 3 describe the slewing paths *m* and *n* in the directions indicated by the arrows, and the bars of the articulated parallelogram assume the position shown in Fig. 1b and the hinge is closed and concealed inside the two parts.

The diagrammatical operation of the invisible hinge for opening angles up to 180° may be obtained matching two articulated parallelograms as shown in Figs. 2a and 2b.

The invisible hinge for opening angles up to 90° comprises two wings 1 and 2 (Fig. 3) fitted on the two parts to be hinged by screws 3 which pass through holes 4 and three clips 5, 6 and 7 connecting the wings. In order to realise the movement of the articulated parallelogram, this connection is made in the following manner: clips 5 and 7 respectively connect the upper and lower ends of side AB of wing 1 to the upper and lower ends of side EF of wing 2 by means of pins 8, 9, 10 and 11; clip 6 connects the middle of side AB of wing 1 to the middle of side GH of wing 2 by means of pins 30 and 31. Thus it is possible to realise the movement of an articulated parallelogram for opening angles up to 90°.

The diagrammatical operation of the invisible hinge for opening angles up to 180° is that of two matched articulated parallelograms; with reference to Figs. 2a and 2b, one may see the movement of part *a* relative to part *b*: points M, N and O describe the slewing paths *m*, *n* and *r* and take up the positions M', N', O' on part 10, and points P and Q describe the slewing paths *p* and *q* and take up the positions P' and Q' on part *b* and thus the hinge is closed.

The invisible hinge for opening angles up to 180° according to my invention comprises the two wings 12 and 13 (Fig. 5) fitted on the two parts to be hinged by screws 14 which pass through holes 15, and clips 16 and 17 for connecting by means of ribs 18, 19, 20, 21, 22, 23, 24 and 25 of pins 26, 28, 27, 29, 32, 33 and 34, the wings 12 and 13; these wings are case-like in shape with a flap of their bottom part folded inwards. Pins 26 and 27 lie along the folding line. Another connection between wings and ribs is afforded by clips 35 and 35 hinged on one side to pin 34 and on the other respectively to pins 32 and 33.

Thus it is possible, in this case, to realise the movement of two matched articulated parallelograms for opening angles up to 180°.

LIVIO CENCIONI.

THE HISTORY OF THE UNITED STATES

OF AMERICA

FROM THE FIRST DISCOVERY TO THE PRESENT TIME

BY

WILLIAM STURGEON, ESQ.

OF THE BARR

LONDON

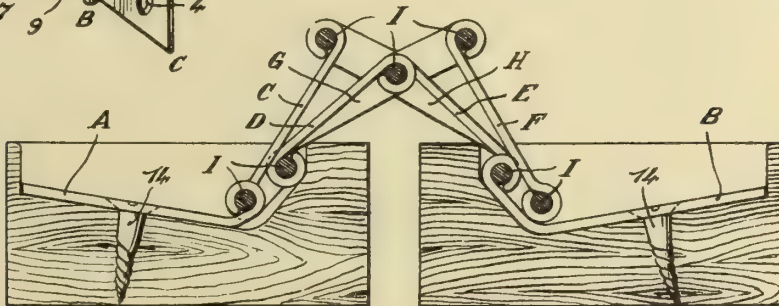
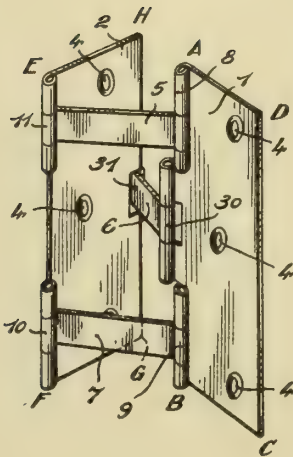
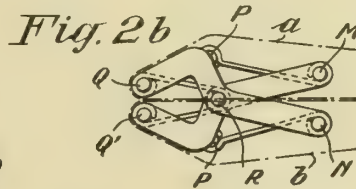
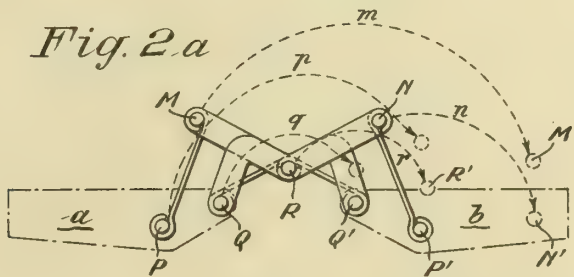
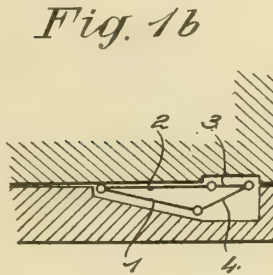
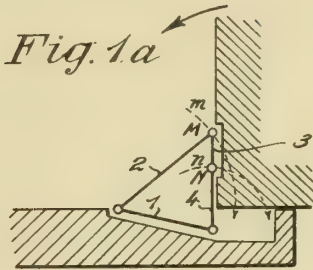
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1794.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

L. CENCIONI
CONCEALED HINGES
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Serial No.
368,949
2 Sheets-Sheet 1



Inventor,
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APRIL 27, 1943.
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Serial No.
368,949

2 Sheets-Sheet 2

Fig. 6

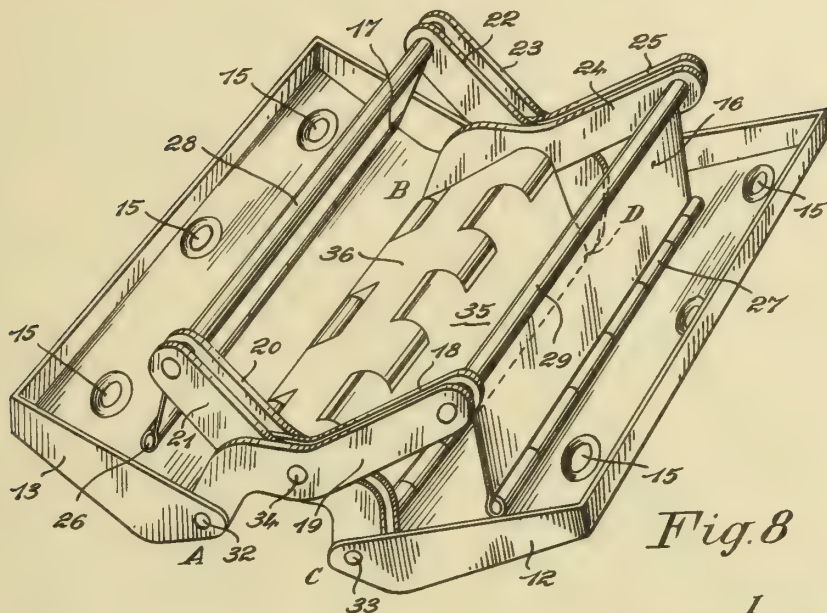


Fig. 8

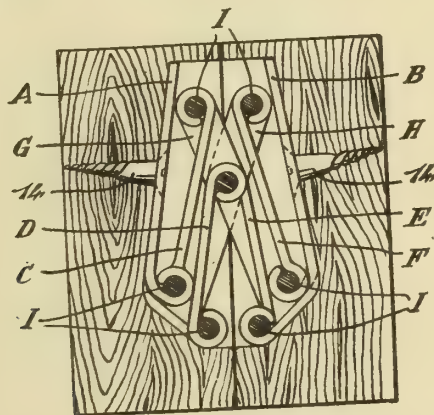


Fig. 4

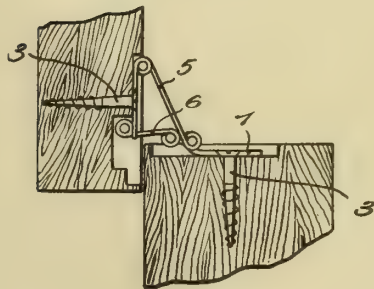
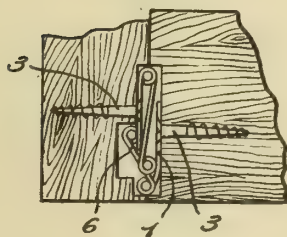
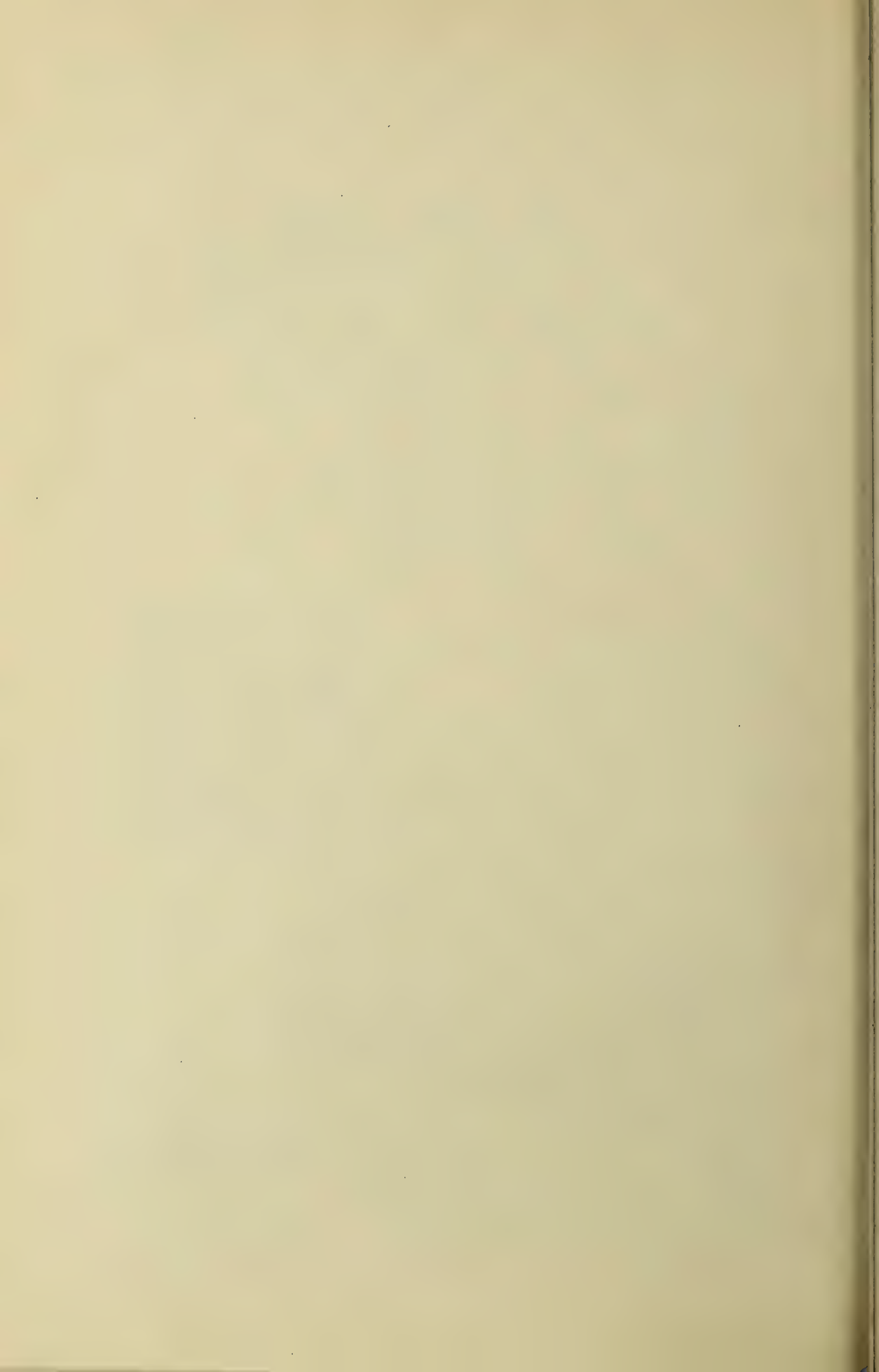


Fig. 5



Inventor,
L. Cencioni

By: *Glascok Downing*



ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF ARTIFICIAL FILAMENTS, FIBERS AND FOILS

Johannes Kleine, Dessau, Germany; vested in the
Alien Property Custodian

No Drawing. Application filed December 7, 1940

My invention relates to new filaments, fibers, foils, films and the like and more particularly to such articles made from high molecular weight paraffines.

This case is a continuation-in-part of my co-pending application Ser. No. 341,183, filed June 18, 1940, which is directed to a process of preparing artificial fibers, foils, films and ribbons from high molecular weight paraffines containing more than 400 carbon atoms in the chain and produced from coal or carbon monoxide by hydrogenation under a pressure of 150-200 atms.

This invention has for an object the provision of fibers, films and the like from paraffines produced by hydrogenation under a low pressure.

Another object is to provide fibers and the like from paraffines produced by hydrogenation under atmospheric pressure.

Further objects will be apparent from the reading of the following description.

I have found that fibers, films and the like cannot be obtained only from paraffines produced by pressure hydrogenation as disclosed in my co-pending application mentioned above, but also from paraffines prepared according to "Fischer's Synthesis." Compared with the process described in the co-pending application the employment of the latter paraffines has the great advantage that products with straight chains are mainly formed which are very suitable for the intended use in question. Especially useful are hydrocarbons containing at least 600 carbon atoms, and of these hydrocarbons paraffines with more than 800 carbon atoms and a straight chain have highly valuable properties.

It is therefore of advantage to carry out the synthesis of the paraffines in such a manner that as many hydrocarbons with very high molecular weight as possible are produced. It is also possible to obtain such paraffines from the mixture of the hydrocarbons prepared by the normal pressure process or to extract them from the contact substance after the synthesis has been carried out for a certain time. However, the way first mentioned above is the most favourable.

It has been found that "Fischer's Synthesis" yields a high percentage of the desired paraffines if carried out at a low temperature, i. e. a temperature which is lower than that at which the catalyst leads to formation of benzine hydrocarbons as characteristic products on the same conditions apart from this. Moreover, it is advantageous if the amount of the gas mixture upon which the contact substance acts and the height of the catalyst layer are relatively small. In most

cases it is favourable to employ catalysts strongly pressed. Furthermore paraffines suitable for the present invention are prepared if a greater amount of hydrogen is used in the synthesis than corresponds to a ratio of $\text{CO}:\text{H}_2=1:2$, for instance ratios of 1:2.2 or 1:2.3 (or more).

The reaction may be carried out by means of catalysts suitable for producing paraffine hydrocarbons according to "Fischer's Synthesis." Useful are metals of the eighth group of the periodic classification, especially the metals of the iron group, the platinum group and the palladium group. In general it is preferable to employ catalysts containing cobalt, nickel or copper.

The synthesis may be accomplished by passing the reactants either in gaseous or in liquid form through the contact substances. In the former case it is generally of advantage to extract the highest molecular weight paraffines after a certain duration of action, for instance by boiling aromatic hydrocarbons such as tetrahydronaphthalene. It is also possible to use several solvents together or one after another, for instance, a mixture of benzene and toluene or first benzene and subsequently xylene. The extraction may also be carried out under different pressures. The contact substances may, for instance, be treated with benzene under atmospheric pressure until the paraffines have ceased to dissolve. The pressure is then increased to 10 atms. and the highest molecular weight paraffines are subsequently extracted with the benzene which now possesses a higher boiling point.

When liquid reactants are present, a fixed catalyst may be used upon which the gas and the liquid act simultaneously. When catalysts in suspended form are used, portions of the resulting products may be separated continuously from the circulation in order to obtain the desired paraffines therefrom.

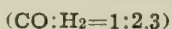
It is important to prevent the temperature from rising too rapidly during the reaction. For obtaining suitable paraffines it is therefore necessary to lead off the formed heat of reaction as fast as possible, for instance, with the aid of a cooling apparatus which is directly connected with the contact chamber and in which the heat of reaction serves to warm or evaporate liquids. The heat may also be removed inside the contact chamber by cooling the oil. Furthermore the temperature may be decreased by intensely circulating and carrying off the reaction gases out of the contact chamber and cooling them outside it. It is also possible to obtain a cooling effect by wetting the catalysts with

liquids which evaporate when heated. Finally combinations of several cooling methods are applicable.

The high molecular weight hydrocarbons may be produced in one or several stages. Sometimes it is desirable to combine the synthesis described above with other manufacturing processes, for instance a process of making benzine or gasolene. In this case it is convenient to prepare high molecular weight paraffines according to the present invention in the first stage and benzine hydrocarbons in the next stages from the gases exhausted in the first step.

The more detailed practice of the invention is illustrated by the following example, wherein parts given are by volume. There are of course may forms of the invention other than this specific embodiment.

The contact substance ($\text{Co-Al}_2\text{O}_3\text{-ZnO}$) which is arranged in the contact chamber of a pipe furnace, the pipes of which have a diameter of 15 mm., is strongly pressed and the height of the catalyst layer is 1 m. The gas mixture



is passed through the contact chamber under a pressure of 11 atms. and a velocity of 60 parts of gas per one part of catalyst for one hour at 180°C . The synthesis is stopped after a duration of action of 48 hours, whereupon the contact substance is extracted with liquid benzene at boiling temperature under atmospheric pressure until the paraffines have ceased to dissolve. The pressure is then raised to 6 atms. and the extraction continued. Finally the extraction is

carried out under 11 atms. When these extraction procedures are finished, the gas mixture is again passed through the contact chamber. The paraffines extracted under 11 atms. melt at about 133°C . This modification of the synthesis yields 10 grams of such paraffines per 1 cbm. of gas mixture.

The paraffines thus obtained may be freed from the low melting constituents by fractional extraction with xylene. The resultant paraffine yields valuable fibers on spinning from melt. Especially useful is the process disclosed in U. S. patent application Ser. No. 220,236, filed July 20, 1938. In using this spinning process the paraffine is cast to form a rod (or ribbon) which is then brought into a melting room electrically heated and closed by the spinning nozzle having an inside diameter of 0.03 mm. The rod is molten near the nozzle and the molten paraffine is then pressed through it by the weight of the rod itself. The extruded filaments as they are collected may be transferred without a loop over two drums, the second of which is driven with a speed 5 times that of the first drum, whereby the filaments are stretched and thus obtain an extremely high strength.

The high molecular weight paraffines produced according to the present invention are worked up in the manner as described in the co-pending application Ser. No. 341,183 mentioned above. The filaments, foils and films made from these paraffines may likewise be used for the production of textile goods, wrapping materials, photographic films and the like.

JOHANNES KLEINE.

ALIEN PROPERTY CUSTODIAN

LIGHT POLARIZING BODIES AND METHOD OF PRODUCING SAME

Kurt Meyer, Berlin-Zehlendorf, and Hans Lapp,
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the Alien Property Custodian

No Drawing. Application filed December 9, 1940

This invention relates to the manufacture of light polarizing elements comprising transparent media in which light polarizing particles are dispersed in uniform orientation.

The invention particularly deals with the production of light polarizing foils in which the light polarizing particles dispersed in the transparent medium are oriented under the influence of mechanical, electric or magnetic forces.

Light polarizing elements of this type have been produced up to now by dissolving the transparent media, as for instance, cellulose derivatives in which the polarizing particles are to be retained in suitable solvents. The light polarizing particles, as for instance, herapathite, or other double fraction and dichroitic substances, were dispersed in these solutions and the liquid compounds produced in this manner were poured by suitable pouring devices upon bases of the required type. Uniform orientation, required for the polarization of light, is then brought about by causing mechanical, electrical or magnetic forces to act on the polarizing particles in these liquid compounds, and finally the liquid compounds thus treated are converted into solid light polarizing elements by evaporating the solvents.

In carrying out the process as outlined above, it has been found that owing to the evaporation of the solvents during the complete stage of orientation, strata or areal portions of a viscosity different from that of the remainder of the liquid may be produced within the very liquid compounds containing the polarizing particles. These conditions are encountered particularly when solvents of high volatility are employed.

The presence of layers or films of differential viscosity exerts an influence upon the orientation of the particles owing to the creation of shearing forces within the liquid. It may even lead to the production of areas filled with non-oriented particles in the polarizing bodies. Such areas containing non-oriented polarizing particles, occur especially whenever pieces of these surface films tear off and drop directly upon the pouring base.

The light polarizing elements produced while proper orientation of the particles was impeded through the formation of strata or films of differential viscosity are of poorer quality and lower commercial value.

It has been discovered that the formation of these films or the formation of surface layers of differential viscosity in the liquid carrier mass of light polarizing particles may be avoided during the stage of orientation, thereby also en-

hancing the commercial value of the product, by causing the orientation of the light polarizing particles to take place in an atmosphere which has been enriched or is permeated by vapors of the solvents contained in the liquid carrier or of one or more of the ingredients of the same,—in which case then a formation of films on the surface of the liquid does not occur and areas of differential viscosity are not formed.

The invention, therefore, deals with the production of light polarizing elements from carrier solutions of transparent media containing light polarizing particles in dispersion and in which the said light polarizing particles oriented by mechanical, electric or magnetic forces, the production taking place in an atmosphere which has been enriched or permeated by the solvents contained in the liquid carrier, or by one or more ingredients of said solvents, in such manner that the formation of surface layers or films of differential viscosity is prevented during the orientation.

The invention also includes the light polarizing elements themselves, particularly light polarizing foils produced by the method referred to.

This method of production, according to the invention, furnishes uniform, contiguous or self-contained light polarizing elements, particularly foils of excellent quality. The method can be performed in different ways. It is not subject to the employment of any particular apparatus.

For instance, the pouring machine of any well known or desired construction may be provided, at those points at which the mechanical, electrical or magnetic forces causing orientation, become effective, with open chambers or with closed chambers surrounding the transparent liquid carrier mass in which the polarizing particles are dispersed. These chambers may be provided with means for inducing evaporation of the solvents. Loose bulk material of large surface extent, as cotton batting, cellulose, kieselguhr and the like, or even chunks or blocks of higher porous material may be positioned in these chambers so as to be accessible to penetration by the liquid carrier. These materials are then saturated with the solvents or with its more readily volatile ingredients respectively. Care must be taken, however, that the solvents or ingredients which evaporate are continuously renewed by suitable devices.

A further example of carrying out the process includes the steps of conveying gases, as air, nitrogen, carbon dioxide and the like, charged with the solvent vapors over the fluids while the ori-

entation of the light polarizing particles within these liquid carriers takes place. The conveyance of these gases over the fluid masses advisably takes place at the temperature of the latter.

While the described process is applicable to the production of various light polarizing bodies, particularly foils it has been proven to be of especial value in making light polarizing bodies by pouring the liquid transparent carrier of polarizing particles upon a base, and causing the mass leaving the pouring slot not to be applied directly to the pouring base, but maintaining the poured liquid in free suspension over a relatively great drop between the pouring point and the base, before applying it to the base.

5 The invention is not restricted to the examples indicated solely for the purpose of illustration. It includes all methods by which the light polarizing bodies are produced from transparent solutions of media containing light polarizing particles within an atmosphere which has been charged or even saturated with the solvents contained in the carrier or with one or more of the ingredients of said solvents respectively, the entire process being carried out in such manner that the formation of layers or films of differential viscosity is prevented on the surface during the orientation process.

KURT MEYER.
HANS LAPP.

ALIEN PROPERTY CUSTODIAN

PROCESS FOR EXTRACTING POTASSIUM AND ALUMINIUM FROM MIXED POTASSIUM-ALUMINIUM SILICATES

Giacomo Fauser, Milan, Italy; vested in the Alien
Property Custodian

No Drawing. Application filed December 10, 1940

One of the methods proposed for extracting potassium and aluminium from leucites and similar minerals comprises dry-treating the mineral at temperatures from 1200° C to 1600° C in the presence of limestone or other calcium salts; the double silicate is then decomposed giving a mixture of insoluble calcium silicate and soluble potassium aluminate, which may be separated by lixiviation.

However, this process has a serious drawback owing to the fact that a considerable rate of potassium is lost by volatilisation during the heat treatment, so that rather low yields are obtained. Trials have been made with a view of recovering the potassium volatilised, and also of reducing the temperature necessary to decompose the double silicate (e.g. by subjecting the mineral to forced grinding); but these steps have not been successful. A certain advantage may be obtained by subjecting the mixture to thermal treatment in form of cakes previously prepared by dry-pressing, but even in this way the losses are still almost considerable.

I have now found that the volatilisation of K_2O depends at equal temperatures upon the

amount of burned gases circulating in the furnace in which the thermal treatment is carried out, as each temperature corresponds logically to a certain K_2O -vapour tension. Consequently, to reduce potash losses to a minimum, thermal treatment should be advantageously carried out in muffle furnaces, as in these furnaces heat treatment is indirect.

This method requires however considerable fuel consumption and encounters serious difficulties in design, in view of the high temperatures the material must reach.

I have therefore projected a tunnel furnace with heated wall space; in this way and keeping the space temperature equal to the internal temperature, the heat transmission outside is reduced to a minimum, so that the amount of hot combustion gases to be sent into the furnace is nearer to the theoretical amount and the least necessary.

When operating as outlined above it is possible to reduce considerably the losses in potassium and reach yields of the order of 90% and even more.

GIACOMO FAUSER.

ALIEN PROPERTY CUSTODIAN

PRESSED SLABS OF WOODEN MATERIAL AND PROCESS OF MANUFACTURING THE SAME

Richard Schweizer, Hamburg, and Adolf Menger,
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Alien Property Custodian

No Drawing. Application filed December 12, 1940

Various processes are already known for manu-
facturing pressed slabs of wooden material as
follows: for instance chopped wood, sawdust or
wooden chips, if necessary with simultaneous use
of similar materials and addition of a binding
agent, are placed, according to the thickness and
size desired of the slabs, between press plates
provided with a frame or not and then pressed.

Said manufacture of pressed plates has, how-
ever, the drawback that the material can only
difficultly be distributed in a uniform manner
whereby it may be possible that on pressing a
slab of an irregular thickness or density is pro-
duced. Particularly it often happens that with-
in the press material hollow spaces are formed
by which, as is natural, the strength of the slab
is reduced. Furthermore plates of an irregular
density may show an irregular distribution of
the percentage of moisture; stresses within the
slab and the slab becoming warped in conse-
quence thereof are due to the afore-named fact.

The present invention has for its object a
process of manufacturing pressed slabs of wooden
material according to which the afore-said draw-
backs of the known processes are avoided. The
process resides in the following: instead of di-
rectly pressing the chopped material, preferably
coarsely chopped wood, such as coarse shavings
or chopping waste, if desired in admixture with
similar materials, e. g. straw, cobs of maize or
Indian corn stalks, vulcan fibre and so on, and
a binding agent to plates of a thickness ready for
use, it is first pressed to essentially thicker pieces,
such as logs or beams which are then separated
so as to form slabs of the desired thickness. On
pressing the chopped material which is suitably
performed in a mould corresponding to the de-
sired dimension of the log or beam, the material
and the binding agent which has, if required,
been added are readily distributed in a regular
manner by suitable means, for instance by agi-
tating the mould, perhaps by means of a special
shaking device.

The separating of the logs or beams simultane-
ously allows of testing the surface resistance of

the individual slabs obtained; slabs which resist
the mechanical stress of separation also guaran-
tee a satisfactory resistance in the further course
of their treatment. The slabs manufactured ac-
cording to the hitherto known processes may,
however, show drawbacks which without the same
or a similarly strong strain are not recognizable
before the further treatment.

For some purposes it is advisable to glue two or
several logs or beams with one another and then
to separate them preferably perpendicular to the
straight-glued joint.

As binding agents there are suitable all the
binding agents useful in the treatment of wood,
particularly the glues of artificial resins, such as
urea formaldehyde glue or phenol formaldehyde
glue, glues on the base of polyvinyl compounds,
furthermore glues made of animal or vegetable
products, such as bone-glue, glue from hides,
from leather waste, casein glue, blood albumen
glue, starch or vegetable albumen.

The plates manufactured according to the
process of the present invention are especially
suitable among others as intermediate layers for
slabs.

The following example illustrates the inven-
tion, the parts being by weight:

A mixture consisting of 95 parts of an aqueous
solution of 65 per cent strength of a condensa-
tion product of urea and formaldehyde, 1 part
of ammonium chloride and 4 parts of urea is
added to 1,000 parts of wooden chips. The whole
is thoroughly mixed and the mixture is then
poured into a press mould of a length of 2 me-
ters, a breadth of 1 meter and a height of 1
meter and pressed for 6 hours at 20° C. The
pressing then possesses a sufficient resistance so
that it may be removed from the mould. After a
subsequent storage for 24 hours the logs obtained
may be separated by sawing to plates having for
instance a thickness of 2 cm; they are especially
suitable as slabs.

RICHARD SCHWEIZER.
ADOLF MENER.

ALIEN PROPERTY CUSTODIAN

LIFE-SAVING SUIT

Carl Dybberg, Bygdøy, Aker, Norway; vested in
the Alien Property Custodian

Application filed December 13, 1940

The present invention relates to waterproof life-saving suits, adapted to be drawn on outside the usual clothes, and has mainly for its object to provide a life-saving suit, which is simple and effective and easily can be taken on and off.

The main characteristic feature of the invention is, that the waterproof cloth of the suit, consisting for instance of gutta-percha, caoutchouc tissue, impregnated poplin or the like, is thin and flexible in such a degree, that the suit does not prevent ones movements worth mentioning, for the purpose that the suit also may be used as a working dress as well as a life-saving suit. Further features of the invention will appear from the following description of an embodiment of the device.

In order to describe clearly my invention I will refer to the accompanying diagrammatical drawing, wherein:—

Figure 1 shows the suit rolled down before the drawing on and at a somewhat larger scale than the remaining Figures.

Figure 2 shows a side view of the suit after the drawing on but before the closing of the top opening, and

Figure 3 shows the same after the closing.

Figure 4 shows a front view of the suit after the closing.

Figures 5 and 6 illustrate a manner of making a wristband.

Figure 7 shows another construction of the wristband.

The suit consists of waterproof cloth, which is thin and flexible in such a degree, that the suit does not prevent ones movements worth mentioning. According to the invention the suit therefore is fit for use as a working dress as well as a life-saving suit. When a ship is travelling through a danger zone the crew as well as the passengers may have the suit on all the time, the suit not causing any drawbacks during the work or other occupation. The thin and flexible cloth also has the advantage, that the suit can be drawn on as quickly and easily as ordinary clothes. The cloth may consist of gutta-percha, caoutchouc tissue, impregnated poplin or the like, the thickness of which preferably being below 1 mm. The suit eventually may be impregnated after being sewed together.

The suit consists of a wide, bag-shaped part 1 made in one piece with the trousers 2. The trousers either may be closed at the lower ends and provided with widenings for the feet or they may be tightly attached to rubber-boots 3 or eventually galoches as shown on the drawing. In

order to prevent the feet from floating to the surface when the user of the life-saving suit is lying in the water, the soles 4 of the boots may be heavy, for instance consisting of lead or the like, or leaden insoles may be used. Each side of the bag 1 are provided with raglan sleeves 5 attached by means of the seams 15. These sleeves may be provided with watertight wristbands as described below.

The suit is sewed together in a very simple manner, the suit only being provided with one seam 14 on the adjacent sides of the pair of trousers, one seam 13 on the front side from the fork up to the chin and eventually a seam on the back side from the fork to the top of the suit. The latter, however, may be dispensed with if the cloth has a sufficiently great breadth. The seams may be covered by rubber bands or the like. The parts of the suit eventually also may be pasted together.

Apart from the sleeves the suit is quite closed except at the top of the bag 1, which is provided with a wide opening 19 as shown in Figure 2. Through this opening the user steps in when the suit is to be drawn on. The suit has such a width, that it when not in use may be rolled down and placed on the outside of the boots 3 as shown in Figure 1. In this position the suit quickly and easily may be drawn on, the user putting the feet into the boots and then drawing the suit upwards to the position shown in Figure 2. As shown the suit may be provided with a hood 6 attached to the back part of the edge of the opening 19. The hood may be sewed or pasted to the suit or may also be made in one piece with the suit.

The edge of the front part of the opening 19 situated in front of the hood is provided with holes or eyes 7 placed at suitable distances from each other. A draw-string 8 is provided going through said eyes, the ends of the draw-string hanging down on the front side of the suit, while the middle part 8 of the string is running along the back side of the hood 6 and being guided in one or more loops 9 or the like attached to the hood. The edge 20 of the hood may be provided with a tightening elastic band adapted to press the hood edge watertight against the head. Such an elastic band, however, is not necessary.

When the suit is drawn on as shown in Figure 2 the opening 19 is closed by pulling the ends of the draw-string 8, the opening thereby being contracted round the neck as shown in Figures 3 and 4. The edge of the opening 19 thereby is forming folds or corrugations 21, which owing to the pull in the draw-string is pressed against each

other and against the neck at the same time as the edge 20 of the hood is pressed against the head. Practical tests have proved, that by this device a watertight closing of the suit is obtained. When the suit is closed the draw-string is secured by means of a knot or an automatic locking device attached to the string. If desired, the draw-string may be placed in eyes along the edge 20 of the hood instead of running on the back side of the hood.

The hood if desired may be dispensed with. In this case the eyes and draw-string are placed along the entire length of the edge of the opening 19, which is being contracted by pulling the string.

The suit is made relatively wide, thereby in closed position containing a quantity of air causing a sufficient buoyancy. It is, however, important that the suit may be contracted round the waist and therefore it is provided a waist-belt 10 attached to the suit at one or more points or slidably mounted in loops or the like attached to the suit. The suit also may be provided with a strong belt or reinforcement 11 placed outside or inside the suit just below the sleeves. To this belt, which may have a relative great breadth, is secured a strong strap or the like provided with a suitable hook 12', by means of which it is possible to hook oneself to a life-raft or the like or to other shipwrecked persons. The belt 11 if desired may be provided with more straps or the like or other life-saving devices.

The suit also may be provided with shoulder-straps or the like, but this has proved unnecessary.

If desired, the suit may be provided with one or more floaters for instance filled with kapok, reindeers hair or other suitable material. As floaters also rubber cushions or tubes may be used, which may be filled with air. The floaters may have a relative small thickness and a great area and may be permanently secured to the outer or inner side of the suit. The floaters also may consist for instance of rubber cushions filled with kapok or the like. These cushions are placed in pockets 12 inside or outside the suit when the suit is to be used for life-saving. When the suit is used as a working dress the cushions may be removed.

The pockets 12, which may be placed anywhere on the suit in a suitable number and may have any suitable shapes and dimensions, also may be used for keeping small quantities of food, a knife, an electrical pocket lantern, a whistle, a compass, fire-works and other equipments.

A floater shaped as a tube filled with kapok or air also may be used, said tube being placed round the body. When the user of the suit while at work wants to have the upper part of the body free, the suit may be rolled down about said tube for instance to the waist. The suit in this case so to say looks like rubber trousers or wading trousers, and the suit very quickly can be rolled upwards and used as a life-saving suit when it is necessary to jump in the water. The floater tube, however, is not shown on the drawing.

Instead of the floater being combined with the suit, of course a life belt or a life-saving jacket already at hand may be used outside or inside the suit.

As above mentioned the sleeves of the suit at the wrists may be provided with elastical wrist-

bands fitting water-tightly round the wrists. Such a wristband may consist of an elastical rubber strip of a suitable breadth sewn or pasted to the sleeve wrist. According to Figures 5 and 6 the wristbands may be produced in that manner, that the sleeve is reversed (Figure 5) and the sleeve wrist 16 is drawn over a mould 19', which for instance may be cylindrical. Then the elastic band 17 is pasted to the sleeve after being somewhat stretched, the band being suitably placed in such a position, that the band edge projects somewhat outside the sleeve edge. When the elastic band is attached the mould 19' is removed, whereby the band and consequently also the sleeve opening is being contracted somewhat. Then the sleeve again is reversed (Figure 6), and it will be seen, that the outer side of the sleeve wrist owing to the said contraction in being folded as indicated by 18, the folds making an expansion of the sleeve wrist possible when the hand is forced through the sleeve opening.

As shown in Figure 7 a watertight closing of the sleeve opening also may be obtained by attaching a thin, flexible and elastic caoutchouc tissue 22 to the edge of the sleeve opening. The caoutchouc tissue is provided with a central hole 23, through which the hand is forced when the suit is being drawn on, the diameter of the hole being somewhat smaller than that of the wrist.

In order to obtain an absolute watertight closing of the sleeve an additional inner sleeve 24 may be provided, the opening of which being closed by a flexible and elastic watertight tissue 25 with a central hole 26 for the arm. As shown the tissues 22 and 25 are situated at some distance from each other.

If desired, detachable mittens or gloves provided with an elastic wrist edge may be used in combination with the suit. The mittens or gloves eventually may be permanently secured to the suit.

The different details of the suit, however, may be varied in different manners. If desired, for instance eyes and draw-string may be dispensed with, and in this case the closing of the suit is obtained thereby, that the edge of the upper opening is placed round the head and the neck and is secured by means of hooks, bands or the like. In order to secure a watertight closing the edge of the opening may be provided with an elastic band. If closing of the suit by means of a sliding lock is desired, a tab of elastic or non-elastic material must be provided behind the sliding lock. The tab must have a breadth sufficient to allow the bag 1 to expand to its normal width.

Tests have proved, that it is possible to a person to eat when lying in the water. To obtain this the upper opening must be contracted tightly close behind the nose, so that the mouth is situated below the edge of the opening. When the person is going to eat one or both arms are drawn out of the sleeve or sleeves respectively, the sleeve opening being closed by a plug or a clip. Then it is possible to put the hand and hands respectively in the pockets of the clothes inside the suit or in the inner pockets of the suit.

It is also stated, that when the suit as described is used it is possible to keep the body warm during a long time even if the shipwrecked person is lying in icy-cold water.

CARL DYBBERG.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

C. DYBBERG
LIFE-SAVING SUIT
Filed Dec. 13, 1940

Serial No.
370,077

Fig. 1.

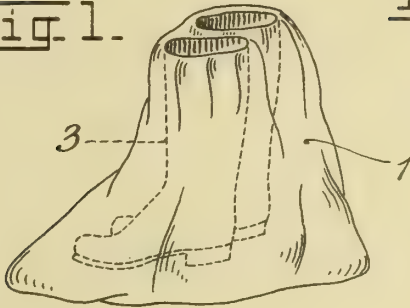


Fig. 2.

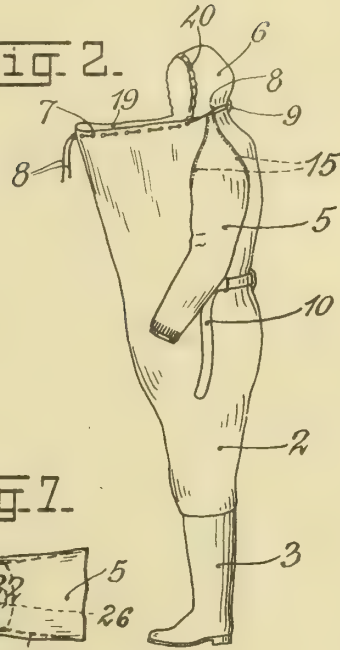


Fig. 3.

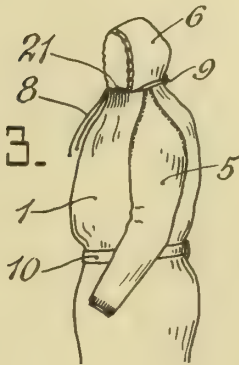


Fig. 7.

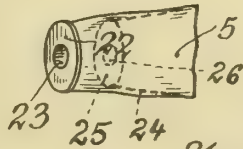


Fig. 4.

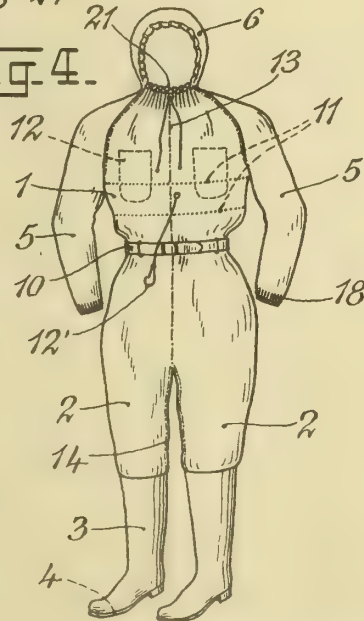


Fig. 5.

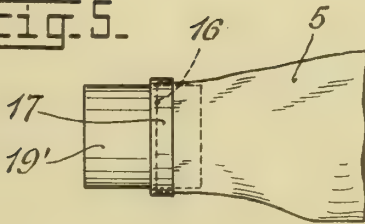
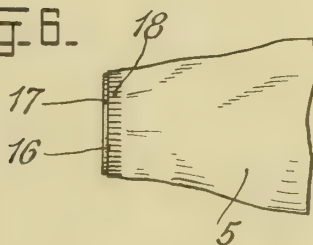
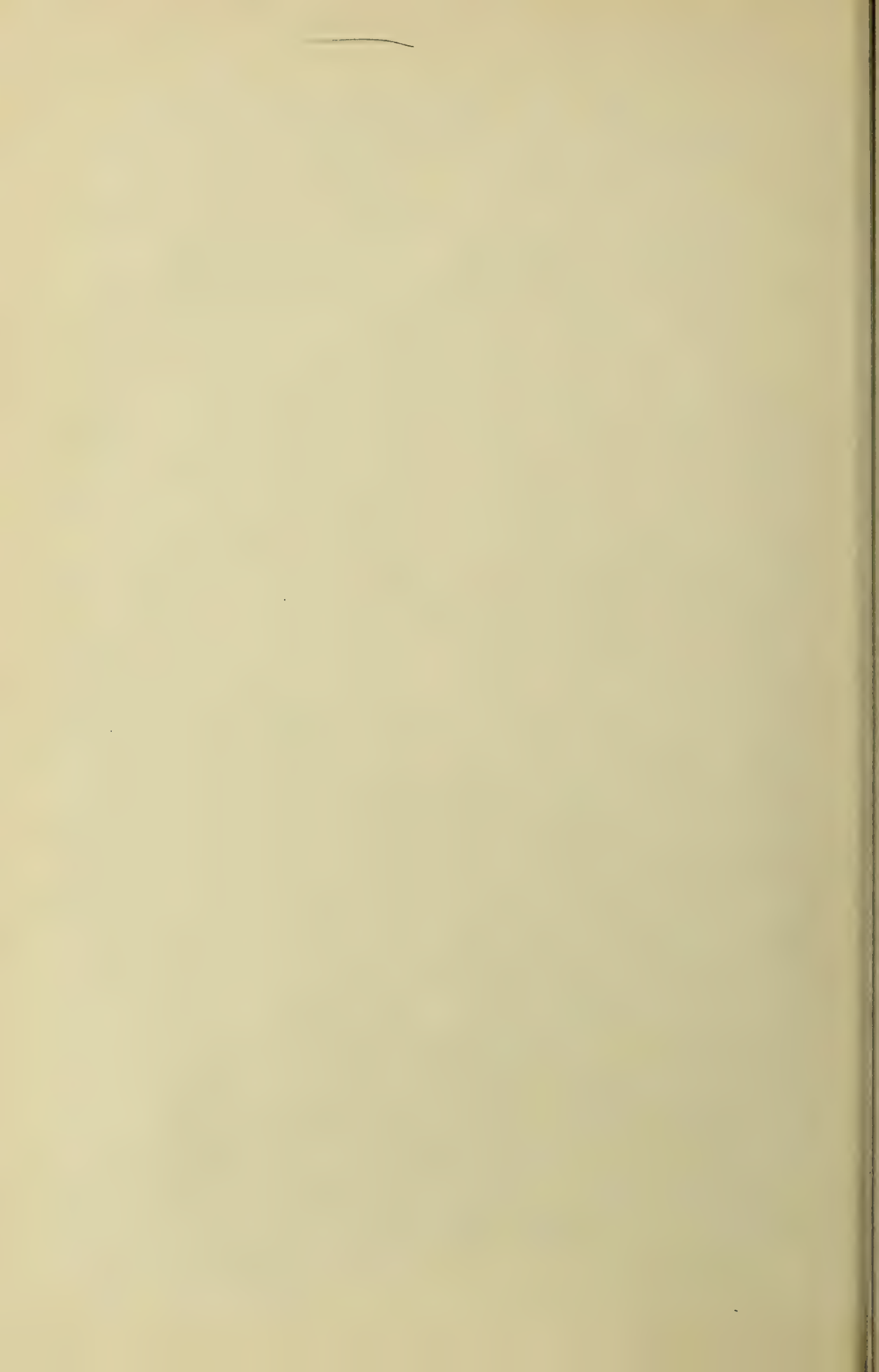


Fig. 6.



Inventor:
Carl Dybborg
By: *Stevens and Davis*
Attorneys



ALIEN PROPERTY CUSTODIAN

MULTI-SPINDLE AUTOMATIC LATHE WITH
FEEDING SPINDLE-DRUM AND BOX-
SHAPED, MUTUALLY STAYING UPPER
WORKS

Erwin Kohring, Cologne-Poll, Germany; vested
in the Alien Property Custodian

Application filed December 13, 1940

In order to obtain in multi-spindle automatic lathes with feeding spindle-drum having high output also a great accuracy of the works, it is necessary, that the machine body accommodating the gear elements and tools forms a rigid unit completely protecting and absolutely unsensitive against giving way also of the upper works. With this object in view it has already been proposed, to construct the machine body as frame, in that the gap between the upper works is bridged on their upper parts by beam or frame stays and the longitudinal carriage and feeding gear elements are mounted on these staying elements.

The known propositions are, however, accompanied by the inconvenience, that the connecting beam seriously impairs for eye and hand the remaining free space between the upper works, that is impairs especially in multi-spindle automatic lathes of small and deep construction the clearness of arrangement of the shavings room inside the machine body.

If, however, according to the invention the staying between the upper works is constructed of several parts, for instance as a pair of hollow bodies of preferably cylindrical cross-section arranged below and at the side of the spindle drum, and if their ends are connected, for instance by inserting the same, with the inwardly directed front faces of the corresponding upper work boxes, the above mentioned inconveniences are avoided, and such a staying of or connection between the upper works of the machine body can besides be produced very accurately and therefore very easily and economically. Especially the upper zone of the shavings room is thereby not impeded in the least by the staying spars for the adjusting of the tools, and the advantage is even obtained that movements from one upper work to the other can be brought about by the hollow bodies. These moving elements, whether they are of mechanical type or hydraulic type, are enclosed capsule-like by the staying bodies and thus protected against the fall of shavings, and they enable the transmission of gear branches without complicated and expensive leading off from the most favorable point to other points with exclusion of any disturbing impairing for the surveying of the operation.

The arrangement according to the invention makes it further possible, to utilize the staying bodies for the good mounting and guiding of machine elements necessary for the service, for instance of the tool carriers for the longitudinally moved tools, and the supporting bracket for the transverse carriage can be accommodated by one

of the stayings and can be adjusted or secured in different position, or the hollow bodies may be made useful for the longitudinal shifting of the longitudinal and transverse carriages, according to the work to be carried out.

An embodiment of the invention is illustrated by way of example in the accompanying drawings, in which

Fig. 1 shows a four-spindle automatic lathe in front elevation with fixed tool carrier for the tools moved in longitudinal direction and with stationary bracket for the transverse carriage,

Fig. 2 is a cross-section on line II—II of Fig. 1,

Fig. 3 shows the automatic lathe in front elevation viewed from the right hand side of Fig. 1, and

Fig. 4 shows the four-spindle automatic lathe, but with longitudinal or transverse carriage arranged on the staying bodies so that the carriages can be moved in longitudinal direction.

In Figs. 1 to 3 designates 1 the lower bed part, 2 the left hand and 3 the right hand box-shaped upper work, 50 the driving engine mounted on the left hand box-shaped upper work 2, 6 the spindle-drum which is mounted in the upper work 2 and progressively moves from one operating position into the other, said spindle-drum carrying according to Fig. 1 four revolving working spindles 7; two cylindrical, hollow staying bodies 4 and 5 are arranged below and at the side of the spindle-drum 6 and effect spar-like a rigid connection between the upper works 2 and 3, the ends of these staying bodies being detachably fixed in the corresponding inward front walls of the upper works. The tool carrier 8 rests on the staying bodies 4 and 5 and can be secured in position on these staying bodies by means of clamping screws 9. 10 and 11 designate two supporting brackets carrying the transverse carriages 12 and 13, the staying bodies extending through the upper part of these brackets 10 and 11, whereas the lower parts of these brackets are fixed by means of screws 14, if desired with interposition of a spacing plate not shown and which may be of any desired thickness, on the front wall of the box-shaped upper work 2, said front wall facing the bracket.

The transverse carriages 12, 13 are driven in known manner by worm drives 15 through the intermediary of cam shaft 16, cam disc 17 and a lever 18 hingedly mounted in the bracket 10 or 11 respectively, the other ends of said lever engaging on the corresponding transverse carriage 12 or 13. The feed drive of the tool axes 19, 20, 21, 22 extending through the tool carrier 8 is effected

for instance from the front-side staying body 4 by means of a shaft 24 extending through this staying body and by means of the toothed wheel 23 mounted on this shaft, through the intermediary of a worm drive 25, a cam shaft 26, cams 27 fixed on this shaft 26 and by four levers 28 to 30 oscillating each one about the fixed axle 29, by four other lever rods 31 hingedly connected with the four levers 28 to 30, each of these lever rods being hingedly connected with the corresponding end of the tool axles 19, 20, 21, 22. One of the tool axles, in the example shown the axle designated by 21, has to serve as rapid boring spindle and therefore must carry out a revolving movement besides its shifting movement in longitudinal direction. This is effected from the staying body 5 which is the rear one relative to the upper work of the machine by the shaft 32 extending in longitudinal direction through the staying body 5 and through the intermediary of toothed wheels 33, 34 and 35, as shown in Fig. 3.

If the tool carrier 8, as shown in Fig. 4, as tool carriage 36, has to be equipped with clamped-in

tools, not shown, and if longitudinal shifting movements have to be imparted to the same, the staying bodies 4 and 5 serve as sliding guides for the carriage 36. The drive is then effected by a spur wheel 37 keyed on the end of a shaft 38 extending through the longitudinal channel of the staying body and by a spur wheel 39 fixed on the other end of the shaft and meshing with spur wheels 40, 41 through the intermediary of a cam disc 42 keyed on the shaft of the spur wheel 41 by an arm 43, mounted on the longitudinal carriage 36 and carrying a cam engaging in the curved groove of drum 42.

In a similar manner the staying body 4 may be utilized as sliding carrier for shifting the supporting bracket 44 in longitudinal direction, as shown in Fig. 4, in cooperation with a shaft 45 extending through the bracket stays, the drive being then effected by a worm gear 46, a cam drum 47 and a shifting arm 48 mounted on the bracket 44 and having a cam engaging in the groove of the cam drum.

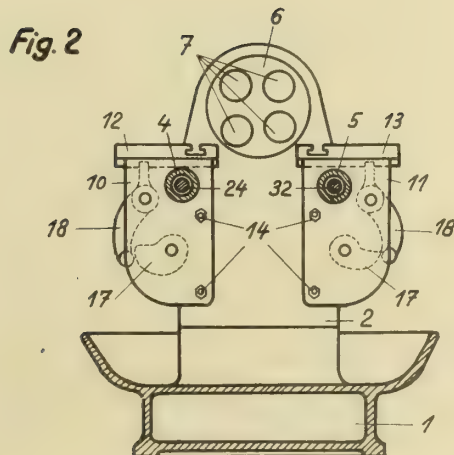
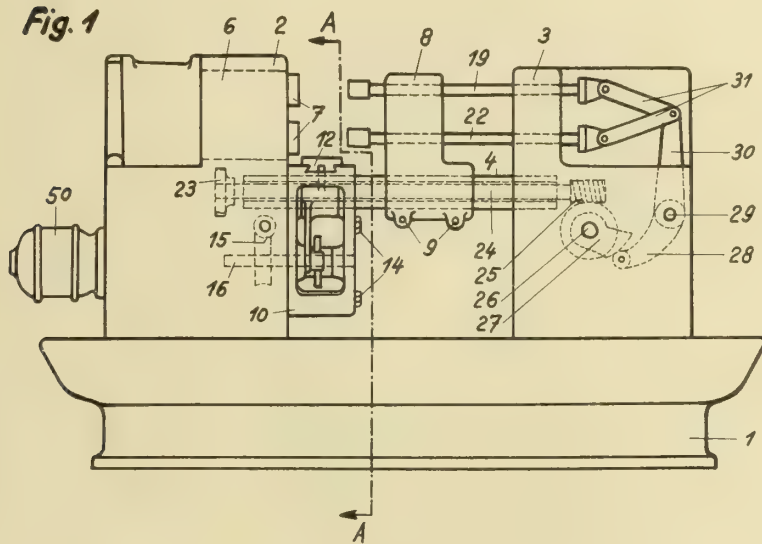
ERWIN KOHRING.

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BY A. P. C.

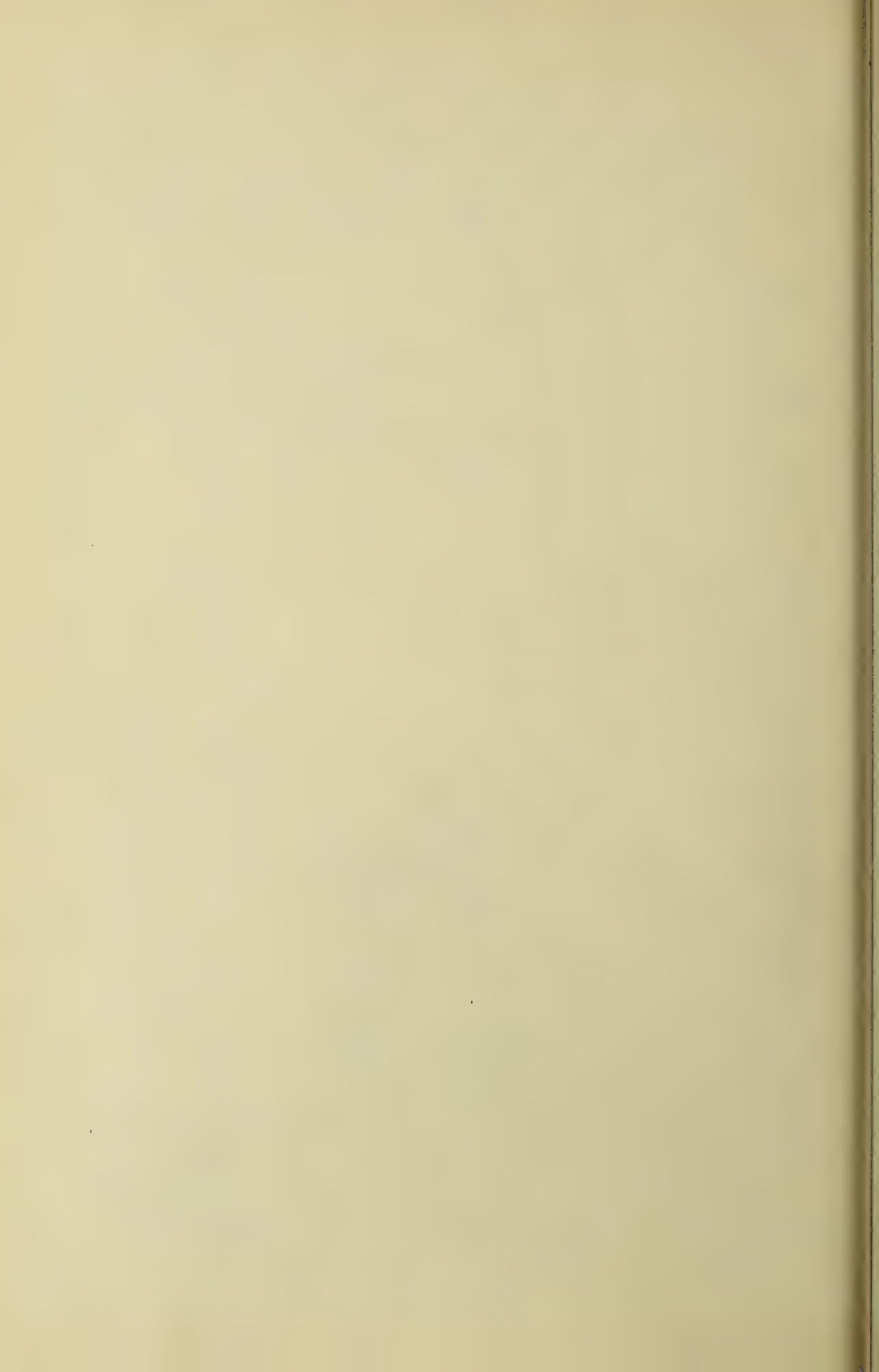
E. KOHRING
MULTI-SPINDLE AUTOMATIC LATHE WITH FEEDING
SPINDLE-DRUM AND BOX-SHAPED, MUTUALLY
STAYING UPPER WORKS
Filed Dec. 13, 1940

Serial No.
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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3

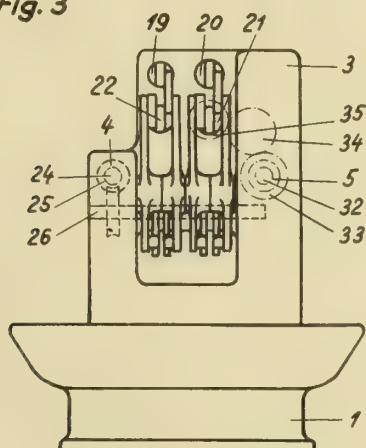
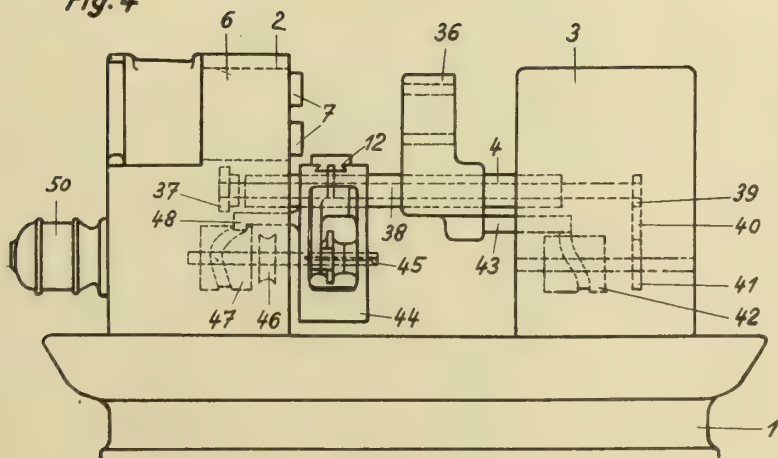
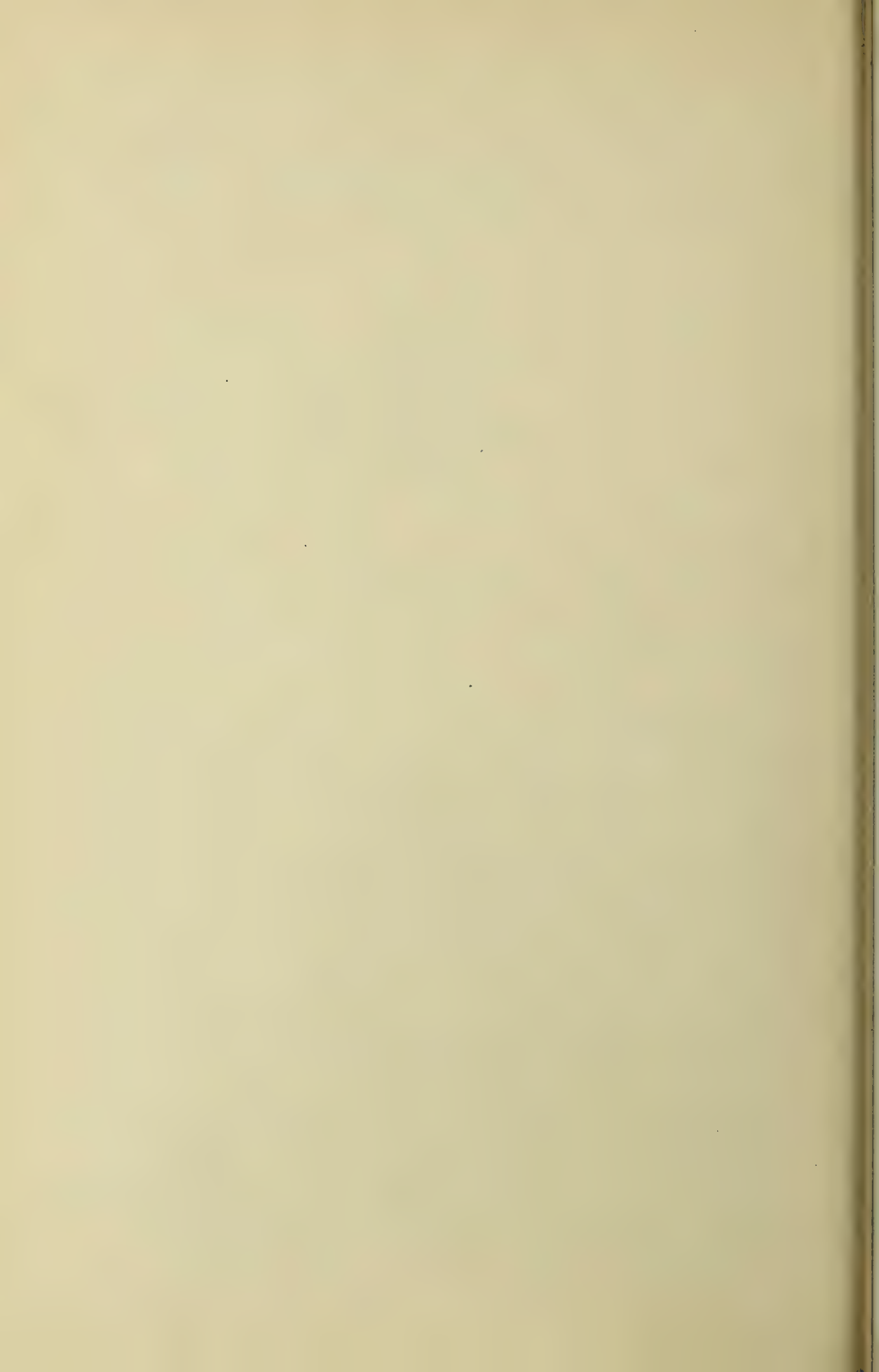


Fig. 4



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ALIEN PROPERTY CUSTODIAN

MULTI-SPINDLE AUTOMATIC LATHE WITH FEEDING SPINDLE DRUM

Erwin Kohring, Koln-Poll, Germany; vested in the Alien Property Custodian

Application filed December 13, 1940

In order to utilize as many sidedly as possible the working possibilities of multi-spindle automatic lathes with feeding spindle drum and to consequently increase also the range of action and the efficiency of such machines, it has been proposed to provide for carrying out slit-cutting, boring, screw-thread cutting and similar proceedings additional tools for the last mentioned operations at the side or below the work spindle. Disturbances in the course of the proceedings for the finishing may, however, easily occur and influence the accuracy of the working owing to the fact that the additional tool carriers and the gripper which conveys the semi-finished works to the tools are located more or less within the space for collecting the shavings. Auxiliary means or upper works are further often required heretofore, which are far projecting and have to be brought from distant points and which hinder the work of the attendant, especially when placing in the work.

If, however, according to the invention a suitable surface preferably on or on the top of the casing which encloses the spindle drum a suitable surface is provided on which the additional tools for carrying out the final work are mounted, the tools in question and their driving elements can be absolutely removed from the space through which the shavings drop, so that the above mentioned inconveniences do not occur, the less so as the space at disposal can be so great that the attending workman cannot be hindered by the additional arrangements. The above mentioned idea permits also of mounting the gripper near or preferably above a work-spindle position which is on the top and destined for the last operation, so that without impeding of the gripper the works which have been cut off or which have to be fed to the desired tool can be deposited by the gripper in upward direction outside the range of the drop of shavings or fed to the corresponding tool.

If in further development of the present invention the gripper is constructed in known manner as a reciprocating lever and if the coordinated transverse carriage to be arranged on the inward front face of the spindle-drum casing is constructed in known manner flat with tool or cutting off tool on the outer side, the gripper can be moved close over the transverse carriage out of the room into which the shavings drop, with obtention of a perfect order as regards space and supervision in the lower zone of the shavings space, in order to bring the works to a predetermined point for treatment or to several such points.

The period for such an additional operation or for several operations must evidently be shorter in such instances, it be singly or all together, than necessary for one course of operation situated between two successive feed motions. For increasing the working possibilities the gripper may therefore be also constructed with several arms, for instance star-shaped, whereby it becomes possible that the stepwise moved gripper can grip at the same time a fresh, semi-finished work, whilst it brings the already gripped work to further treatments in the rhythm of the rotation of the spindle-drum. With the aid of the star-shaped three armed gripper the additional tools can therefore utilize for each one of their operations the full time between two feed motions, which means practically for the construction of automatic lathes an increase of the number of work-spindles by two further units, a similar great time for removing the shavings being at disposal for all points of treatment.

An embodiment of the invention is illustrated by way of example in the accompanying drawing, in which

Fig. 1 shows in front elevation a four-spindle automatic lathe with the construction according to the invention of a surface for the additional tools arranged above the spindle head casing,

Fig. 2 is a cross-section on line II—II of Fig. 1, and

Fig. 3 shows in side elevation a construction of the gripper as three-armed oscillating lever.

The spindle-drum casing *b*, together with the coordinated head piece *b*₁ constructed as bearing face for the additional tools, and with the work spindle-drum *c* moving from one working position into the other, is arranged on the left hand side of the bed *a* of the multi-spindle automatic lathe. Four working spindles, *d*, *e*, *f* and *g* revolve in the spindle drum. The longitudinal carriage *h* is shiftably mounted on the middle of the bed. The bed carries further the lower transverse carriages *i* and *k*, (Figs. 1 and 2) whereas under the overhanging portion of the head piece *b*₁ one of the two upper transverse carriages *l* is guided. The other upper transverse carriage *m* is mounted with the lower side of its working face on the inner front wall of the spindle-drum casing *b*, so that its outer cutting-off tool *n* extends, for instance, parallel to the front wall of the spindle-drum casing, as shown in Figs. 1 and 2.

Above the upper front side spindle *g*, the one-arm gripper *q* is mounted on the axle *p* in a recess *o* of the head piece *b*₁ so that it can oscillate. The surface of the head piece *b*₁ is provided as

bearing- or clamping face r for receiving additional tools at s and t , for the drive of which also sufficient room is at disposal.

The arrangement described and shown operates in that at the cutting of the work and shortly before the feed motion of the spindle-drum c , the gripper g carries out in usual manner a longitudinal movement relative to its axle, grips thus the semi-finished work and oscillates between two feed motions of the spindle-drum just over the flat transverse carriage m rapidly in upward direction out of the main range of the shavings removal and feeds the work successively to the points of treatment s and t . After the finished works have been deposited the gripper oscillates

back into its initial position to in front of the spindle g .

Fig. 3 shows a construction of the gripper u as three-armed, star-shaped oscillating lever arranged in the same manner. It works in that it carries out a further rotation by 120° each time in the rhythm of the feed motion of the spindle-drum. After the gripping of a cut work on the spindle g a work is at the same time fed thereby to each point of treatment v and w . The third arm is then actually in front of the cutting spindle g . For every additional treatment at v and w the full time between two drum feed motions is thereby at disposal.

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Fig. 1

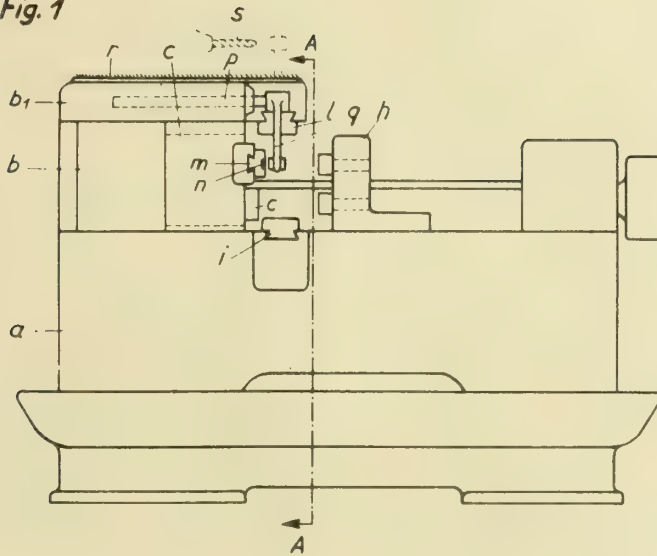


Fig. 2

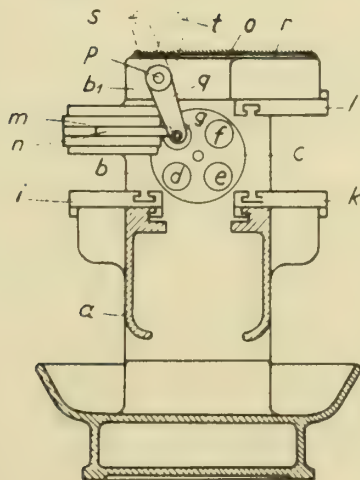
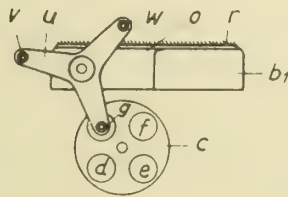
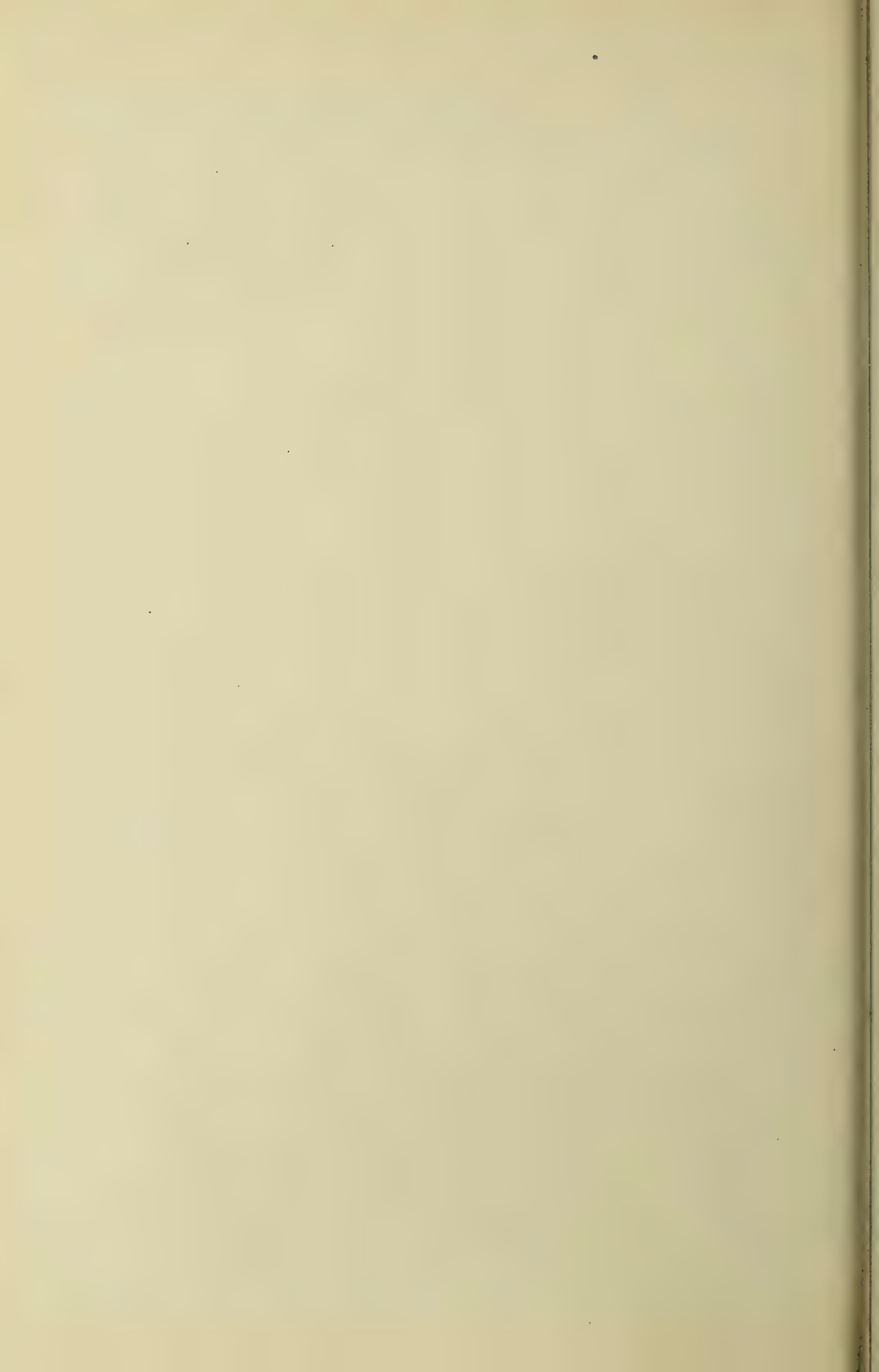


Fig. 3



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ALIEN PROPERTY CUSTODIAN

PROCESS OF PREPARING ANHYDROUS SODIUM-ORTHOSILICATE AND SODIUM-PYROSILICATE

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Alien Property Custodian

No Drawing. Application filed December 19, 1940

The present invention relates to the process of preparing anhydrous sodium-orthosilicate and sodium-pyrosilicate.

For preparing in the anhydrous state sodium-orthosilicate (Na_4SiO_4) and sodium-pyrosilicate ($\text{Na}_2\text{Si}_2\text{O}_7$), known in the art as "sub-silicates", it has been proposed to heat a mixture of quartz and solid caustic soda in a corresponding proportion up to a temperature below the melting point of caustic soda (322°C) and, thereupon, to raise the temperature of the sub-silicate obtained to 300°C – 600°C , preferably to 450°C , in order to remove any quantity of water chemically bound or adhering thereto. According to another known process anhydrous solid subsilicate is obtained by introducing, while stirring, quartz into molten sodium hydroxide at a temperature between 300°C and 600°C , preferably at 500°C .

Thorough experiments have shown that there are only a few exceptional cases in which under the above conditions of working the product theoretically calculated according to the quantities of reactants used, is actually obtained. It has been ascertained that in the preparation of the subsilicates not only the proportion of the substances used and the temperatures of reaction applied have to be considered but also the pressure of the water vapor above the reaction mixture in the reaction vessel which pressure plays a decisive part in the reaction.

According to the present invention the desired composition may only be obtained if the following three factors are considered:

(1) Proportion of the quantities of the starting substances used

(2) Reaction temperatures

(3) Pressure of water vapor in the reaction vessel.

I have found that the formation of anhydrous sodium-pyrosilicate from SiO_2 , advantageously used in the form of quartz, and caustic soda takes place only at a temperature above 402°C and only if the pressure of water vapor above the reaction mixture during the reaction lies below the value calculated according to equation (I) wherein p_1 is the pressure of water vapor in mm Hg and T is the absolute temperature:

$$\log p_1(\text{mm}) = -\frac{18020}{4.571.T} + 8.224 \quad (\text{I})$$

Furthermore, I have found that sodium-orthosilicate may be obtained from the above parent materials at temperatures up to 402°C only if the pressure of water vapor above the reaction

mixture is smaller than the pressure p_2 calculated according to equation (II):

$$\log p_2(\text{mm}) = -\frac{11980}{4.571.T} + 6.268 \quad (\text{II})$$

or at temperatures above 402°C if the steam pressure above the reaction mixture is smaller than the pressure p_3 calculated according to equation III:

$$\log p_3(\text{mm}) = -\frac{5797}{4.571.T} + 4.254 \quad (\text{III})$$

It results from the foregoing that at temperatures below the melting point of caustic soda (322°C) no sodium-pyrosilicate is formed since it is stable only at temperatures above 402°C . Sodium-orthosilicate may be obtained at temperatures below the melting point of caustic soda only if the pressure of water vapor is smaller than about 73 mm Hg. If, on the other hand, in a manner analogous to that of the known processes quartz is introduced into molten caustic soda and a vessel provided with a cover is used in which the water vapor produced during the reaction of quartz with caustic soda with formation of metasilicate, remains for some time, neither pyro- nor orthosilicate may be obtained at temperature up to about 460°C . In the presence of water-vapor of atmospheric pressure and in accordance with the above equations orthosilicate is formed only at temperatures above 483°C , pyrosilicate only at temperatures above 465°C . None of these two compounds is obtained at temperatures up to about 400°C if an oven is used for the reaction which is heated internally by means of gas and in which, therefore, an atmosphere of a high partial pressure of water vapor is always present. Since only hydrogen may be used for heating, the partial pressure of water vapor in the combustion gases amounts, at complete combustion with the aid of air, to about $\frac{1}{3}$ atmosphere, that is to say about 250 mm Hg. At such a pressure of water vapor, however, metasilicate reacts with caustic soda only at temperatures of about 410°C and more with formation of pyro- or orthosilicate.

The substitution of sodium metasilicate (Na_2SiO_3) or sodium disilicate ($\text{Na}_2\text{Si}_2\text{O}_5$) for the silicic acid (SiO_2) in the reaction mixture involves no disadvantages.

Thus, the subject matter of the present invention is a process for preparing anhydrous sodium-orthosilicate and anhydrous sodium-pyrosilicate by heating the respective mixture consisting of silicic acid or sodium metasilicate or sodium di-

silicate, on the one hand, and caustic soda, on the other hand, to temperatures of between 300° C and 600° C; for the preparation of pyrosilicate the temperature is raised to at least 402° C, the pressure of the water vapor above the reaction mixture lying below that calculated according to the foregoing equation I; for the preparation of orthosilicate at reaction temperatures of up to 402° C a pressure of water vapor is maintained in the reaction vessel which is below that calculated according to the foregoing equation II or, if temperatures above 402° C are used a pressure of water vapor is maintained which is below that calculated according to the foregoing equation III.

The following examples illustrate the invention; the parts are by weight:

(1) 3 parts by weight of anhydrous sodium metasilicate are intimately mixed with 1 part by weight of anhydrous caustic soda and heated to 450° C, care being taken by introducing air that the pressure of water vapor above the reaction

mixture lies below 500 mm Hg. Crystalline anhydrous sodium pyrosilicate ($\text{Na}_6\text{Si}_2\text{O}_7$) is obtained.

(2) 3 parts by weight of anhydrous sodium metasilicate are intimately mixed with 2 parts by weight of anhydrous caustic soda and heated in a current of dry air to 350° C. The mixture completely reacts with formation of anhydrous crystalline sodium orthosilicate (Na_4SiO_4).

(3) 3 parts by weight of finely ground quartz are gradually heated with 8 parts by weight of sodium hydroxide in anhydrous form or in the form of an aqueous solution to 350° C. By passing dry air over the mixture care is taken that the pressure of water vapor above the reaction mixture remains smaller than about 100 mm Hg. Anhydrous sodium orthosilicate is obtained in a quantitative yield.

MARGARETHE ZINTL, GEB STEINHEIL,
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Deceased.

ALIEN PROPERTY CUSTODIAN

METHOD AND APPARATUS FOR MOLDING UNDER PRESSURE, PARTICULARLY IN- JECTION MOLDING PLASTIC MATERIAL

Fritz von Opel, New York, N. Y.; vested in the
Alien Property Custodian

Application filed December 21, 1940

This invention relates to a method and apparatus for injection molding of plastic or plasticised material, and in particular of thermoplastic materials, such as cellulose acetates, polyvinyl and acrylate resins and polystyrenes.

In injection molding methods and apparatuses of this type, the material to be injected is plasticised in one part of the machine or process, and injected under suitable pressure into mold cavities formed in two plates or sections facing each other. One of these sections is removably mounted on a stationary clamping plate which is rigidly connected with a cylinder in which the solid and preferably powdery initial moldable material is being heated to plasticising temperature. A reciprocating piston is arranged within that stationary cylinder and injects at its forward stroke the plasticised material through suitable channels into the mold cavities, while at its back stroke sufficient space is given to feed a preferably measured quantity of moldable material into the stationary cylinder.

The other one of the two sections provided with the mold cavities is removably mounted on a movable clamping plate; by reciprocating the latter plate, the mold is opened and closed. When closed, the plasticised material is injected into the cavities of the closed mold sections; when opened, the molded and solidified finished product can be removed or the mold sections exchanged.

For reciprocating the movable, clamping plate, toggles, hydraulic or other power driven means, such as driven by an electro-motor, have been used; those means are to open the mold sufficiently for the purposes mentioned, and to close it. While the plasticised material is injected, it exerts pressure upon the mold cavities from within. Cleavages between the mold sections giving cause to flashes of the injected material occurred however with mechanical means for reciprocating the movable clamping plate with the mold section thereon, if the toggle-joints began to wear out during use. If hydraulic or other power means were used, they had to be dimensioned so that the mold sections were tightly pressed together and flashes prevented while pressure from within was exerted upon them, while the power needed for opening and closing the mold is considerably smaller. Even with such high power drives flashes could not always be avoided, and it was suggested to use additional means for locking the clamping plates in their closed position. To this effect power driven bolts provided with screw threads were connected with one of the

clamping plates and engaged screw threaded nuts provided on the other clamping plate when the mold was closed. By turning those screw threaded bolts the clamping plates were pressed against each other and held so during the injection process proper. However, those screws were operated while the mold was closed and the cooperating surfaces of the screw threads on the bolts and of the nuts were turned while under high and still increasing pressure. This made them wear rather soon, and considerable power was needed to turn them in order to finally exert the desired clamping pressure.

According to the invention separate means are provided for merely opening and closing the mold, i. e. for reciprocating the movable clamping plate, and for exerting the clamping pressure during injection proper. Relatively little power is needed to rapidly effect the mere reciprocating motion, thereby the cycle can be shortened and wear reduced. The clamping plates in their closed position are locked by separate means even before plasticized material is injected into the mold cavities, so that very little power is needed for bringing these locking means into their locking position, and their wear is minimised. Thereafter high pressure is applied between the locked clamping plates, the pressure being produced between the clamping plates and mold sections thereon substantially without the aid of the tie-rods or frame of the machine; thereby the weight of the machine and the strength of many of its parts can be considerably reduced, as well as the masses of heavy and strong movable parts, the power needed for driving them, and their wear. According to the further invention, also separate power means are used for effecting the practically idle portion and the power portion of the stroke of the injection plunger.

With injection machines heretofore known, changing from one kind of material to another, in particular from one color to the other was quite difficult. The injection cylinder had to be cleaned thoroughly before a new kind of plasticised material could be used. According to the invention, the injection cylinder or at least part of it is made movable so that one cylinder can be replaced by another one during operation and even during one cycle of the machine.

It is therefore an object of the invention to reduce the wear and to prolong the life of an apparatus for injection molding plasticised materials.

It is another object of the invention to increase

the efficiency and reduce the cost of operating and maintaining such an apparatus.

It is still another object of the invention to reduce the wear of and power needed for actuating locking means between the clamping plates in their closed position, by locking them while not yet under load and before the plasticized material is injected.

Another object of the invention is to reduce the wear of and power needed for reciprocating and clamping the clamping plates, by using another source of power for clamping together the locked clamping plates than used for moving the movable clamping plate into its closed and open position.

It is a further object of the invention to shorten the time needed for each cycle.

It is a still further object of the invention to reduce the wear of the mechanism or power drive for the injection plunger.

It is a still further object of the invention to provide separate power means or mechanism for effecting the more idle portion of the stroke of the injection plunger and its power portion.

It is another object of the invention to relieve the frame structure of the machine from stresses due to clamping the clamping plates and to reduce stresses in the frame structure caused by the injection pressure.

It is a still further object of the invention to reduce the amount of fluid to be moved under pressure and circulated for operating various parts of the machine.

It is a further object of the invention to reduce stresses in and wear of the machine, by adjusting the pressure in a fluid used to operate certain parts of the machine to individual requirements.

It is a still further object of the invention to facilitate change of material to be injected, in particular during a cycle of operation.

It is a still further object of the invention to arrange exchangeable cylinders, or parts thereof, for injecting under pressure the plasticized material while preferably a single injection plunger and in any case a single mechanism or power drive for actuating it is provided.

It is still a further object of the invention to provide a movable injection cylinder and in particular exchangeable injection cylinders pressed against a clamping plate or mold section by another source of power than that which propagates the injection plunger of the machine.

It is another object of the invention to reduce the masses to be moved and the weight of the machine.

It is still a further object of the invention to improve the uniform heating of the material to be injected and to shorten the period of time needed for its plastification.

It is still another object of the invention to heat the material to plastification temperature and keep it plasticized without overheating and deteriorating it.

It is still a further object of the invention to improve the ejection means for the molded units, and thereby further to shorten the cycle of operation.

These and other objects of the invention will be more clearly understood when the specification proceeds with reference to the drawings in which by way of exemplification Fig. 1 shows a vertical cross section with parts in elevation, through a vertical machine embodying the invention, Fig. 2 a side elevation seen in the direction of arrow II in Fig. 1, Fig. 3 a horizontal cross section with

parts in elevation, along line III—III in Fig. 1, Fig. 4 at larger scale a detail of Fig. 3 and Fig. 5 a cross section with parts in elevation along line V—V in Fig. 4, Fig. 6 a horizontal cross section with parts in elevation along line VI—VI in Fig. 1, Fig. 7 a cross section with parts in elevation along line VII—VII in Fig. 1, Fig. 8 a vertical cross section at a larger scale, with parts in elevation, through the injection cylinder, Fig. 9 a cross section with parts in elevation along line IX—IX in Fig. 8, Fig. 10 a cross section with parts in elevation taken along line X—X in Fig. 8, Fig. 11 at a larger scale a cross section through parts of the closed mold sections, Fig. 12 a vertical cross section with parts in elevation through a modification of the injection cylinder, Fig. 13 a vertical cross section through a modification of the mounting of several injection cylinders, Fig. 14 a cross section with parts in elevation along line XIV—XIV in Fig. 13, Fig. 15 a plane view and Fig. 16 a cross section along line XVI—XVI in Fig. 15 of a stripping ring used for the injection plunger in Fig. 1, and Figs. 17 and 18 in cross section modifications of the pressure device for clamping the mold sections.

Identical reference numbers in different figures indicate similar parts.

Referring to Fig. 1, 10 is a horizontal base plate, on which vertical columns or tie-rods 11, 12 are mounted. In this exemplification of the invention, the columns consist of tubes for the purpose to be described later on. It should be understood that instead solid rods can be used, or any cast or forged uprights integral with or connected in any suitable way with the base plate 10 to form the frame of the machine.

A clamping plate 13 is fixedly or adjustably mounted on tubes 11, 12 by means of screws 14, 15. Instead, lugs can be provided on plate 13 through which uprights 11, 12 pass, an abutment on the uprights below the lugs and a nut screwed on the uprights from above onto the lugs, or other well known means for holding plate 13 firmly in position.

A mold section 16 is secured to the stationary clamping plate 13 in an exchangeable manner, e. g. by means of a suitable number of bolts 17 the heads of which are positioned in recesses 18 of mold section 16. Mold cavity parts 20 of any desired shape are provided in mold section 16 and connected through influx channels 21 with an influx opening 22 on top of mold section 16 and positioned within a cylindrical bore 23 of clamping plate 13.

Another mold section 24 is provided with the complementary parts 25 of the mold cavities, individually aligned with the cavity parts 20.

Mold section 24 is removably mounted on a piston or plate 26 in a similar way as section 16 on clamping plate 13, e. g. by bolts (not shown).

Piston or plate 26 of sufficient strength substitutes the second clamping plate as heretofore used in machines of this type. Piston 26 is arranged within and liquid-tightly contacts the upper cylindrical portion 28 of a vessel 27 which is preferably half-ball shaped. If the height of the circumferential running surface of piston 26 contacting portion 28 does not suffice for properly guiding the piston and to prevent jamming, the running surface can be elongated by cylindrical projections provided on top and/or bottom of the piston. Piston 26 and the cylindrical inside surface of portion 28 are either ground exactly to measure, as is assumed in Fig. 1, or piston 26 may be provided with elastic piston rings for this

purpose. Instead and as shown in Fig. 17, portion 28 and piston 26 may be provided with circumferential grooves 29 and 30, respectively, and the edges of a cuff 31 of leather or any other suitable resilient material liquid-tightly clamped into those grooves. It is also possible to liquid-tightly fasten, e. g. weld a resilient metal membrane 34 to the inside portion 28, as shown in Fig. 18, to mount a clamping plate 35 on the membrane and to connect therewith removably mold section 24.

Vessel 27 and piston 26 or membrane 34 are preferably operated by means of a non-compressible fluid though also a gaseous fluid could be used. Their function is principally hydraulic, and they will be referred to hereinafter and in the appended claims as "hydraulic means".

Lugs 36, Figs. 1 to 5, are arranged on the outside of portion 28 and provided with cylindrical holes 37.

Each hole 37 is provided with two sets of projections 38, arranged opposite to one another, each set covering a little less than 90°. Bolts or pins 39 are rotatably mounted coaxially with the cylindrical holes 37 in clamping plate 13. The bolts or pins 39 project downwardly and upwardly beyond plate 13, and their downwardly projecting portions are each provided with two sets of projections 40 at opposite sides, each of the projections covering a little less than 90°. The projections 38 and 40 are so arranged that upon pushing lugs 36 over the downwardly projecting portions of pins 39, the projecting sets 40 pass the spaces between the projecting sets 38, and upon subsequent turning the bolts or pins 39 about 90°, each projection 40 passes under and contacts the juxtaposed projection 38, thus effecting a multiple bayonet connection of great strength.

It will be appreciated that the position of piston 26 relative to vessel 27 depends on the volume of liquid contained in the latter which is kept as constant as possible by means of device 64. The latter is connected through tube 65 and return valve 66 with the space inside vessel 27. If some liquid leaks out between piston 26 and cylindrical portion 28 of vessel 27, a corresponding amount of liquid is supplied from vessel 64, either by actuating the piston shown on top of the liquid in that vessel, or by the action of a weight or spring resting on that piston. Thus, when vessel 27 is being lifted into its uppermost position, piston 26 will always have a definite position relative to that vessel.

On piston 26 and clamping plate 13 exchangeable mold sections are mounted the thicknesses of which vary. Therefore, if vessel 27 and piston 26 are lifted, they will stop at various distances from clamping plate 13. The minimum combined thicknesses of mold sections 16 and 24 determine the uppermost position of piston 26 and its minimum distance from clamping plate 13. Projections or flanges 40 and cooperating projections 38 should be arranged in such a manner that all the flanges 40 engage all of the projections 38 when piston 26 and thereby vessel 27 and portion 28 are stopped in their uppermost position, as defined above. If the mold sections are thicker, only a part of flanges 40 can engage a corresponding part of projections 38. The number of those projections and their surface areas should be such that they in any event can safely sustain the pressures exerted upon them during operation in any relative position of the hydraulic pressure means relative to clamping plate 13.

The number of relative positions of the hydraulic pressure means relative to clamping plate 13 corresponds obviously to the number of levels in which flanges 40 are arranged on pins 39. If the combined thicknesses of the cooperating mold sections require a position of the hydraulic means relative to clamping plate 13 intermediate between those levels determined by the number of flanges, metal sheets can be inserted between a mold section and the clamping plate and/or a mold section and piston 26 so as to compensate for lack of thickness. It will be appreciated however that there is no necessity for the mold sections to contact each other in any of the relative positions of the hydraulic pressure means and clamping plate 13; as will be seen later on when the operation of the invention is described, piston 26 is raised within vessel 27 when pressure is exerted upon the fluid within that vessel whereby the mold sections are brought in contact even if they had been slightly spaced from one another previously.

Instead of arranging flanges 40 and cooperating projections 38 in planes vertical to the axis of pins 39, they can be arranged individually in any other desired plane, such as a helical plane coaxial with the pins 39.

On the upper ends of pins 39 toothed wheels 41 are secured which rest upon the upper surface of clamping plate 13. The contacting surfaces of the wheels and clamping plate may be ground so as to minimise friction; lubrication (not shown) can also be provided. Wheels 41 are turned while no load rests on the flanges 40 so that the power required for rotating the wheels and the friction caused thereby are practically negligible.

A ring 43 toothed on its outer periphery 44 is turnably arranged on top of clamping plate 13 and meshes with the toothed wheels 41. Arm 45 is connected or made integral with ring 43 and joined by link 46 with piston rod 47 and piston 48 which is slidably arranged within a cylinder 49. By admitting a fluid under pressure, i. e. oil or air, through tube 50, piston 48 will be moved so as to turn ring 43 a predetermined angle, while by admitting the pressure fluid through tube 51, piston 48 and ring 43 will be returned to their initial position. Suitable abutments 52, 53 may be provided, preferably in an adjustable way, to limit the motion of arm 45.

It will be appreciated that by rotating ring 43 in one or the other direction, all the pins 39 are rotated in unison and their projections 40 either brought in engagement with or disengaged from the projections 38 of lugs 36; in the first case portion 28 and thereby vessel 27 are locked with clamping plate 13.

It will further be appreciated that any of the pins 39 can be pushed upwardly in plate 13 when the mold is open, until uppermost flange 40 contacts the lower surface of plate 13, giving more free access to the bottom of plate 13 for exchanging or cleaning mold section 16. The gears 41 and 43 are disengaged and re-engage in such up- and downward movement of a pin 39.

On the lower side of vessel 27 a cylinder 54 is mounted, the bottom 55 of which is supported by and connected with rod 56 which in turn is secured to piston 57. A pressure cylinder 58 is mounted on base plate 10 and piston 57 slidably arranged in it.

Forks 59, 60 provided on portion 28 slidably engage the uprights 11, 12. Thus vessel 27 is guided on the uprights and also by piston 57 in cylinder 58. Ring shaped bronze bearings of suf-

ficient height and strength sliding on uprights 11, 12 can be rigidly mounted in the forks 59, 60.

In cylinder 54 a piston 61 is arranged on which a pin or rod 62 is mounted which passes through a stuffing box 63 into vessel 27.

A flexible tube 67 is connected on one end with an inlet in the bottom 55 of cylinder 54 and on the other end through a three-way valve 68 and an adjustable reduction valve 69 with the hollow space in tube 12.

Cylinder 58 is open on the top and connected near its bottom through tube 70, three-way valve 71 and tube 72 with a source of fluid under pressure which may be the same as used for actuating e. g. piston 61.

Above bore 23 of clamping plate 13 an injection cylinder 73 is arranged having a bottom 74 shaped to form a nozzle 75. The injection cylinder is mounted in an arm 76 which is rotatable and slidable on upright or tube 11.

The injection cylinder serves the purpose of heating a charge of moldable material to plasticizing temperature and discharging the plasticized material under pressure into the mold cavities. To this effect, injection cylinder 73, Figs. 8 to 10, is provided with an upper space 126 within lining 137 for receiving a charge of powdery moldable material, such as thermoplastic material of the kind referred to above, and into which fits injection plunger 90. Space 126 may be surrounded by an outside cooling jacket (not shown).

Below space 126 a heating zone for the moldable material is arranged. According to the invention, this zone is formed by a structure easily disassembled for cleaning purposes and comprising a number of tubes 77 to 79 which in this exemplification of the invention are arranged coaxially with a center piece 123. The tubes and center piece are used as heating elements and engage at their lower ends circular recesses 84 formed in a bottom plate 80 which is clamped between the reduced end 82 of cylinder 73 and a circular seat 83 formed inside bottom piece 74. A cross bar 85 is arranged on top of the tubes and center piece and provided with recesses 86 engaged by the upper ends of those tubes and center piece. The cross bar is insulated from cylinder 73 by insulating washers 87 e. g. of mica. Conductor 88 provided with terminal 32 on its outer end passes insulatingly through cylinder 73 and is electrically connected with cross bar 85. Another terminal 33 is connected with cylinder 73 at any suitable place. Preferably bottom piece 74 is insulated from cylinder 73 by means of a circular insulation 124.

It will be appreciated that by connecting a source of electrical current (not shown) with terminals 32, 33, electric current will be passed through cross bar 85 and in parallel through the tubes and center piece engaging the former, and through bottom plate 80 to cylinder 73. By suitably dimensioning the cross sections of the heating elements formed by the tubes and center piece and properly choosing the conductive material of which they are made, furthermore by adjusting the voltage of the electric current applied to terminal 32, 33, it is possible to heat the tubes and center piece individually to any desired temperature. In particular, the temperatures of the tubes and center piece can be made equal, or staggered so as to increase from the outside to the inside or vice versa. The current also passes cylinder 73 and heats it to a temperature which is determined by the cross section, height and material of the cylinder and the voltage acting upon cylin-

der 73 which is electrically connected in series with the bottom plate, the tubes and center piece, and the cross bar. By heating cylinder 73 in the way described or in any other way, obvious to anybody skilled in the art, inevitable losses of heat into the surrounding atmosphere can be compensated for.

It will be further observed that the charge filled into space 126 and forced by the injection plunger entering said space into the spaces between the tubes, the center piece and cylinder 73, is thereby subdivided in circular layers contacting the heating elements over large surface areas and the cross section of which depends upon the distances between the tubes, tube 79 and center piece 123, and tube 77 and cylinder 73. By proper choice of the number of tubes which can be increased or reduced, any desired thickness of those layers can be obtained. The smaller that thickness, the faster will the heat conveyed to the layers from the contacted heated tubes, etc., penetrate into those layers, and the faster will the material of poor heat conductivity comprised by those layers be plasticized. The thinner these layers are, the smaller should be the thermal gradient from the heating elements formed by the tubes, etc., to the material to be plasticized, and the smaller may be the difference between the higher temperature of the heating elements and the final temperature to which the material of the layers is to be heated.

Taking thermoplastic materials as mentioned above, they should be heated to about 320° to 400° F. By proper choice of the thickness of the layer of the material and by making the exposed heat conveying surfaces of the heating elements as large as possible, it can be achieved that the temperature of the latter is higher only by a few degrees than the desired maximum plasticizing temperature of the material of the layers. Whereas in injection cylinders of known structure this difference was relatively great and therefore was apt to burn or ruin the material of poor heat conductivity at least in outside strata when contacted by the heating elements for too long a time, this danger is avoided by the structure according to the invention, because the maximum temperature of the heating elements need not exceed the plasticizing temperature of the material by more than a few degrees. Consequently the material can also remain in contact with the live heating elements for any period of time without endangering or ruining it.

This effect of the invention can also be obtained with other arrangements of the tubes or heating elements than exemplified in Figs. 8 to 10. Thus, for instance, the tubes can be arranged eccentrically and the material forced through the individual tubes and/or around them. In general any arrangement of heating elements within the heating zone of the injection cylinder covers the idea underlying this invention by which the moldable material of poor heat conductivity passing the heating zone is subdivided into layers or strands of sufficiently small thickness and contacts exposed heat conveying surfaces of such relatively large area that heat can quickly penetrate into the layers and substantially uniformly heat them to the desired plasticizing temperature, without overheating or ruining outside strata even if the material is exposed to such heat for a long time.

Bottom plate 80 is provided with a suitable number of as large and wide as possible oblong or circular holes 81 to allow the plasticized ma-

terial to pass into space 138 within bottom piece 74.

In order to avoid undesired cooling of the plasticized material in space 138, the latter may also be heated. To this effect a lining 125 of electrically conductive material of desired composition may be placed on and insulated from the inside surface of bottom piece 74, and electrical terminals (not shown) connected with the lining on opposite sides thereof. Electric current from the same source (not shown) as applied to the terminals 32, 33 may also be fed through flexible conductors to lining 125 and the latter thereby heated to a desired temperature, in general equalling or by a few degrees surpassing the plasticizing temperature of the material forced into space 138. It should be understood that the metallic bottom piece 74 could be used as a heating element, if desired, and lining 125 then be omitted.

There is also provided a container or hopper 91, Fig. 1, for a supply of moldable material to be fed through connecting tube or channel 92 into the space 126 within lining 137 of the cylinder above cross bar 85. Inside hopper 91 feeding means, such as a propeller, are provided and driven intermittently, e.g. by an electromotor, in order to feed predetermined and preferably adjustable amounts of moldable material into the cylinder space 126. These feeding means, their drive and timed control are conventional and therefore not shown in the drawing.

Above cylinder 73, Figs. 1 and 2, a plate 93 is arranged and slidably guided on the uprights or tubes 11, 12.

On plate 93 a cylinder 94 is mounted in which piston 95 is reciprocating, which is connected with injection plunger 90.

Cylinder 94 is closed on top by cover 96 which is provided with lugs 97 to which pairs 98 and 99 of toggle links are hinged. The other pairs of links 100 and 101 of each toggle are hinged to lugs 102 and 103, respectively, provided on cross bar 104 which is rigidly connected with the upper ends of tubes 11 and 12.

The spaces of cylinder 94 above and below piston 95 are connected by channels 105, 106 with a three-way valve 107 which in turn is connected with tube 11 by means of a flexible tube 108.

A sleeve 109 is rotatable around tube 11 and rigidly connected with arm 76 and passes through the left-hand hole of plate 93; between the upper end of sleeve 109 and plate 93 a ball bearing 110 is arranged. Thus arm 76 can rotate relative to plate 93 and tube 11, and is taken along by plate 93 when the latter is lifted and lowered.

Another arm 111 may be connected with arm 76, as to be seen from Figs. 1, 2 and 7, on which another cylinder 112 preferably similar to cylinder 73 and provided with an injection nozzle 113, is mounted.

Between the joints 115 and 118 of the toggle links 98, 100 and 99, 101, respectively, a mechanism for stretching and breaking the toggles is provided. In the exemplification shown in Fig. 1, a piston rod 114 is hinged to joint 115 and attached at its other end to piston 116 which is slidably arranged within cylinder 117; the latter is hingedly connected with joint 118. By admitting a fluid under pressure in front of piston 116 through tube 119, the toggles are straightened out preferably until joints 115, 118 strike rods 11 and 12, respectively; by admitting fluid under pressure through tube 120, the toggles are broken. The mechanism and their timed control for alter-

nately admitting fluid under pressure to one of the sides of piston 116 and for releasing fluid simultaneously at its other side, are conventional and therefore not shown in the drawing.

Fluid under pressure such as oil is continuously pressed into the holes of tubes 11, 12 by means of a pump 124.

This apparatus operates in the following way:

At the start of a cycle the mold is open and mold section 24 with vessel 27, cylinder 54 and piston 57 are in their lower-most position. Injection cylinder 73 with nozzle 75, plate 93, injection plunger 90 and its driving piston 95, and cylinder 94 are in their uppermost position, as shown in Fig. 1.

Now a fluid under pressure, such as oil or compressed air, is admitted through valve 71 into cylinder 58, and thereby piston 57, cylinder 54 and vessel 27 are lifted as close as possible to clamping plate 13, as described above more in detail.

The area of piston 57 and the pressure in the fluid admitted to cylinder 58 are so measured that the weight resting on piston 57 is lifted quickly. It should be observed, however, that no clamping pressure is to be exerted by piston 57 at any time, and consequently the area of piston 57 and/or the pressure in the fluid can be relatively small, just sufficient to raise the weight resting on piston 57 within a desired period of time.

Now fluid under pressure, such as oil, or compressed air, is admitted through tube 50, Figs. 1, 2 and 6, to cylinder 49 and piston 48 completes its forward stroke quickly, thereby turning the toothed ring 48 and all the bolts 39 simultaneously a little more than 90°. Thereby the projecting flanges 40 on bolts 39 are turned into the recesses between projections 38 in lugs 36 arranged on the outside of upper portion 28 of vessel 27 (Figs. 1, 2 and 6), and lock vessel 27 to clamping plate 13. It should be observed that this locking motion is effected while no clamping pressure is yet exerted upon the mold sections 16, 24; consequently little power is needed for rotating ring 48 and bolts 39 and very little wear of the cooperating parts is caused.

After vessel 27 and clamping plate 13 have been thus locked, fluid under pressure, such as oil, is admitted through valve 68 and tube 67 to the lower side of piston 61 in cylinder 54, raises the piston and thereby the rod or pin 62. The latter is pushed into vessel 27 which is filled with a suitable preferably non-compressible fluid, such as oil, and displaces the latter to the effect of exerting a pressure upon piston or plate 26 and thereby on mold section 24 mounted thereon, resulting in the desired clamping pressure between mold sections 24 and 16.

It will be appreciated that the pressure exerted upon the unit of area of plate or piston 26 depends upon the displacement of the oil in vessel 27 by the pushed-in pin 62. The latter is cylindrical with a horizontal top, and it is evident that the pressure for pushing in the pin depends upon the area of this horizontal top and its relation to the pressed upon area of piston 61, while any pressure exerted upon the cylindrical circumference of the portion of pin 62 projected into vessel 27 is balanced in itself. From this it appears that relatively high pressure upon the total area of piston or plate 26 can be exerted by relatively small pressures upon the lower side of piston 61 connected with pin 62. Due to the fact that the pressure exerted by pin 62 upon the fluid in vessel 27 is equally distributed to all sides through the non-compressible fluid, any desired total pressure

can be exerted upon piston or plate 26 and thereby mold section 24 in order to tightly clamp mold sections 16 and 24 and to prevent flashes.

It will be observed that vessel 27 due to its preferred half-ball shape will be capable to receive in the most effective way the pressure exerted upon it by the non-compressible fluid when pin 62 is pushed into the latter. It will be further appreciated that the reaction forces resulting from the pressure exerted upon mold section 16 is conveyed to vessel 27, hence to lugs 35 and flanges 40 engaging the projections in those lugs, hence to bolts 39 and toothed wheels 41 resting upon the upper side of clamping plate 13. No reaction forces are, however, conveyed to base plate 10 or tie rods 11, 12. Cylinder 54 is rigidly mounted on vessel 27 and the pressure of the fluid introduced into cylinder 54 below piston 61 acts solely between the latter, the cylinder 54 and its bottom 55.

No reaction forces resulting from the clamping pressure are conveyed either to piston 57 and cylinder 53, thus completely relieving the frame structure of the machine of any positive or reaction forces bringing about the desired clamping pressure between the mold sections.

Although a half-ball or cup-like shape of vessel 27 is preferred, any other conventional shape of the vessel could be used, e. g. an ordinary cylinder having a bottom attached thereto.

Lowering of plate 93 is effected by admitting fluid under pressure, such as oil or compressed air, through tube 119 into cylinder 117 in front of piston 116. Thereby the toggles 98, 100 and 99, 101 are stretched and cylinder 94 together with plate 93 lowered to their lowermost position. Simultaneously arm 75 connected with plate 93 by sleeve 109, is also lowered and cylinder 73 moved into hole 23 of clamping plate 13. The toggles are dimensioned so that in their stretched position nozzle 75 is pressed onto inlet 22. In order to avoid excessive pressure between the contacting surfaces of the nozzle and the inlet, preferably resilient abutments 121 are provided on the side wall of opening 23, on which the shoulder 122 of the bottom piece 74 of cylinder 73 comes to rest.

According to the invention either one and the same injection cylinder 73 is used in subsequent cycles, or two or more such injection cylinders are used alternatively, or in predetermined rotation. In any case, at any time after injection plunger 90 has been withdrawn from space 126 of the injection cylinder, and before the injection plunger enters again that space in its injection stroke, a new charge of powdery moldable material is to be fed into space 126. To this effect, a propeller or other feeding means within hopper or container 91 associated with that space 126 is operated for a predetermined time so as to feed a measured quantity or charge of powdery moldable material into that space. This can be done by switching in and out an electric motor for driving the propeller at preferably adjustable speed for a preferably adjustable period of time, as is well known in the art and need not be described in detail.

While vessel 27 is being locked to clamping plate 13 by turning the bolts 39 and immediately thereafter pressure is applied to plate 26 so as to tightly clamp mold section 24 against mold section 16, fluid under pressure, such as oil, is admitted through valve 107 into cylinder 94 above piston 95, so that the latter is pressed downwardly and moves injection plunger 90 into

the space 126 of cylinder 73. Thus plunger 90 starts to compress the new powdery material filled into space 126 just after the mold sections have been clamped together and nozzle 75 has been pressed into inlet 22. Thereby the new material is forced into the space between the heating element formed by the concentric rings 77 to 79 and the center piece 123 and forces out and downwardly the material in those spaces which was pressed into them during a foregoing cycle, and has been heated and completely plasticized since. Depending upon the total quantity of material to be injected into the mold cavities, either almost the entire amount of previously plasticized material within those ring spaces or heating zone will be thus injected into the mold cavities, or only part of it; if an extremely large quantity of material is to be injected, also part of the new material just before fed into space 126, may thus be injected after having passed the heating zone and being thus plasticized.

As pointed out above, the temperatures to which the heating elements 77 to 79 and 123, also cylinder 73 and bottom piece 74 and its lining 125, if any, are heated can be adjusted so as to avoid any danger of overheating plasticized material within the heating zone of the injection cylinder and its nozzle, and they both actually work as means for plasticizing the charge or charges and storing the plasticized charge at proper temperature for any subsequent use.

It will further be appreciated that the idle up and down motion of injection cylinder 73 is due to the particular object and feature of the invention that exchangeable injection cylinders are used. If this object is not to be answered, cylinder 73 can permanently be kept in its lowermost position by the stretched toggles. If this object of the invention is entirely to be dispensed with in a machine, the toggles shown can be omitted and cylinder 73 fixedly connected with clamping plate 13 and/or the uprights 11, 12. However, its structure and operation as described above should advantageously be used in order to avoid overheating, etc.

Instead of the hydraulic apparatus 114 to 117, any other well known means for stretching and breaking the toggles can be used, such as an electromagnet, a reversible electromotor, and even manual operation is possible, as well known in the art and therefore not to be described and shown in detail.

In any case, the power required for actuating the toggles or other lifting and lowering means used instead, is relatively small and results in little wear of the mechanisms.

The injection proper for which relatively great force is to be exerted upon the moldable and plasticized material, is produced by injection piston 90 which is propagated by another source of energy and means than those operating the toggles or other means for lowering and lifting the injection cylinder.

As indicated in Fig. 5, a plurality of injection cylinders 73 may be arranged turnable around upright 11. Each cylinder is provided with an individual feeding means and thus material either of the same or of different kinds can be fed into the various cylinders. If an excessive amount of material is to be injected into the mold cavities, and plasticizing of material fed into space 126 is not sufficient, or if parts of the space of the cavities is to be filled first with one kind of material and thereafter their remaining space with another kind of material, the follow-

ing method is used. Cylinder 73 is withdrawn after the amount of plasticized material contained therein is injected to fill part of the cavity spaces, by lifting plate 93 and the parts connected therewith; plunger 90 is simultaneously moved upwardly by admitting fluid under pressure through valve 107 and tube 106 below piston 95 and releasing the fluid above the piston through tube 105; another cylinder 112 is swung in alignment with inlet 22 and lowered into injection position, and plunger 90 is caused to perform another injection stroke, thus filling the remaining part of the cavity spaces.

The plasticized material injected into the cavities rapidly cools and shrinks, until it is cooled below the temperatures corresponding to its temperature distortion point. Plunger 90 is kept under pressure until additional plasticized material compensating for such shrinkage is injected into the mold cavities and the plastic material completely filling the mold cavities has cooled below its temperature distortion point.

It will be appreciated that while this high pressure rests on the material within the cavities and tends to separate the mold sections, any such separation is counteracted by the high clamping pressure produced within vessel 27 by pin 62 in its uppermost position and translated to the mold sections. Relatively little force is to be exerted upon piston 61 to maintain this high pressure, the reaction forces of which are translated by lugs 36 and bolts 39 directly to clamping plate 13, thus relieving the frame structure from almost all such reaction forces.

In order to further reduce and more equally distribute the total clamping pressure required, the contacting surface areas of the mold sections should be reduced as far as possible. To this effect, the individual cavities of at least one of the mold sections end in projecting rims 152 and/or 133, Fig. 11, the contacting surface areas of those rims being as small as the compression strength of the material of the sections safely permits, while the adjacent areas 153 are somewhat withdrawn.

The reaction forces caused by propagating the injection plunger acting through the charge in space 126 upon the plasticized material and the exposed upper surface of rings 77 to 79 and cross bar 85, are translated through inlet 22 upon mold section 16 and in part through the resilient abutments 121 upon clamping plate 13, and the latter translates them to the uprights 11, 12 to which the toggles are hinged which keep cylinder 94 in place during injection proper. By subdividing the plasticized material into layers or strips of relatively great vertical height compared with their horizontal areas, it is possible to reduce the latter considerably. In the same way the exposed upper surface areas of the heating elements and cross bar 85 can be reduced to a relatively small size and rounded off (streamlined). Thereby also the horizontal area of plunger 90 can be reduced to a minimum size. Due to the effective and rapid heating of the subdivided layers or strips, they plasticize quickly and their friction on the heating elements and otherwise is considerably reduced, so that the force for propagating the plunger is also relatively small, resulting in equally small reaction forces to be translated through the uprights 11, 12. The latter and all the other portions of the structure can be made therefore relatively light in weight, resulting in a lighter and less expensive apparatus than heretofore known.

Cooling of the injected material is effected by the relatively large masses of the metallic mold sections. If faster cooling is desired, channels carrying a cooling medium can be arranged in the mold sections, as is well known in the art. Fig. 11 indicates such cooling channels 154. As cooling medium faucet water or artificially under-cooled water, as a refrigerant, such as a refrigerated brine, can be used in order to shorten the cooling period.

After the injected material is cooled and solidified the fluid under pressure below piston 61 is released through valve 68, and piston 61 lowered immediately by action of gravity. If desired, fluid under pressure can be admitted above piston 61 to accelerate its downward movement. Thereby the pressure on the fluid within vessel 27 is released instantaneously, and mold section 24 separates slightly from mold section 16 by action of gravity upon mold section 24 and piston 26. It should also be considered that by withdrawing pin 62, the upper level of the fluid within vessel 27 retreats from plate 26, causing a kind of vacuum below the plate whereby the atmospheric pressure resting on plate 26 comes into play, assisting separation of the mold sections and lowering of plate 26 upon the retreated level of the fluid in vessel 27.

If for one reason or the other the mold sections stick together, additional power means can be provided to separate them.

After the clamping pressure has been released in the way just described, fluid under pressure is admitted through tube 51 into cylinder 49 in front of piston 48, while the fluid at the other side of piston 48 is released through the tube 50. Thereby piston 48 returns into its initial position and rotates ring 48 and thereby bolts 39 so as to disengage the flanges 40 from the projections 38.

It will be appreciated that this return rotation of the pins and flanges and wheels connected therewith, is performed while they do not carry any substantial load wherefrom negligible friction results and the power required for effecting this return movement is consequently small.

As soon as the lock between clamping plate 13 and vessel 27 is thus removed, vessel 27 with all the other parts connected therewith moves downwards under the action of gravity. To this end, the fluid under pressure, admitted to cylinder 58 for lifting vessel 27, etc., is released through valve 71 when flanges 40 are completely disengaged from projections 38. Though the weight of vessel 27 and the parts connected therewith will suffice for its prompt and fast lowering, this may be assisted, if desired, by providing a closure for the top of cylinder 58 and admitting fluid under pressure into the latter above piston 57 in its uppermost position. This is understood by anybody skilled in the art and does not need therefore detailed showing in the drawings.

As can be seen from Fig. 1, the inlet of tube 70 in cylinder 58 is arranged at some distance from and above the bottom of the cylinder. As soon as piston 57 on its downward stroke passes below the inlet opening, the air in the cylinder below piston 57 will be compressed and act like a cushion in decelerating and finally stopping piston 57 with all the parts connected therewith.

As soon as the material injected into the mold cavities is solidified, piston 95 can be raised by admitting fluid under pressure through valve 107 and tube 106 and releasing the fluid on the other side of piston 95 through tube 105 and three-way valve 107. Thereby injection plunger 90 is with-

drawn into its upper position. Simultaneously with or immediately following this withdrawal of plunger 90, fluid under pressure is admitted through tube 120 into cylinder 117 and fluid released from that cylinder through tube 119, whereby the toggles are broken and cylinder 94, plate 93, arm 76 and cylinder 73 lifted to their uppermost position.

If an exchange of cylinder 73 by cylinder 112 is desired, arms 76 and 111 can now be swung around upright 11.

Thereby a cycle of operation of the machine is completed, the mold is open and the molded and solidified articles can be removed, by ejecting and stripping-off means well known in the art.

It will be appreciated that exchange of mold sections can now be easily performed because preferably only two uprights are used as illustrated, leaving free and wide access to the mold sections from both sides of the machine.

In order to effect ejection, the invention prefers to use a compressed fluid, such as air. To this effect, the mold cavity in which the molded solidified article lies after the mold sections are separated, is provided with a bore 127, Figs. 1 and 11, ending in an oblique seat 128. Within the bore, a ring 129 provided with a great number of perforations 130 is arranged through the center bore of which stem 131 of a valve passes; the head 132 of the valve is seated on seat 128 and provided with an outer exposed surface completing the shape of the mold cavity 25. A collar 134 is provided at the lower end of stem 131 and a helical tension spring 135 is arranged between the collar and plate 129, tending to keep head 132 seated.

A channel 136 in mold section 24 opens into the bore 127 below ring 130. It should be understood that all the cavities in mold section 24 are provided with ejection means of the same type, and channel 136 branches off to all the bores of those ejecting means. A fluid under pressure, such as air, is supplied through a flexible tube to channel 136.

As soon as an article is molded and solidified, and the mold sections are separated, compressed air is admitted through channel 136 to bore 127, acts upon the lower side of head 132 and raises the latter, whereby it is permitted to penetrate between the lower side of head 132 and seat 128 into the mold cavity. By raising head 132 and the subsequent influx of air under pressure into the mold cavity, the article contained therein is lifted and thrown out. It can now be removed by stripping means well known in the art. Since the invention is not confined to vertical machines but can equally be applied to e. g. horizontal machines, it will be appreciated that in the latter case the thus thrown-out articles will fall downwardly out of the machine by action of gravity and no stripping means are needed.

While the invention suggests a new way of exerting the high clamping pressure without conveying forces through the frame, and therefore also an injection cylinder of usual type connected with the stationary clamping plate 13 could be used, the injection plunger of which is actuated in conventional way, the arrangement of a movable injection cylinder as hereinbefore described, is of advantage for various reasons and purposes stated.

It is within the object of the invention to reduce heavy moving masses, and therefore a movable injection cylinder may be subdivided in the way shown in Fig. 12. Arm 76 is assumed as

fixedly connected with upright 11, and an injection cylinder 139 with nozzle 140 and provided with heating elements inside as described above, is movably held in a bore 141 of arm 76. Cylinder 139 is provided with a collar 142, and a helical tension spring 143 tends to keep cylinder 139 in its uppermost position.

The injection plunger 90 projecting from cylinder 94 through plate 93, is surrounded by a sleeve 144.

In operation, cylinder 94 and plate 93 are lowered the same way as described with reference to Figs. 1 and 2. Thereby sleeve 144 strikes collar 142 and presses the latter together with cylinder 139 downwardly against the action of spring 143 until nozzle 140 is in its lowermost position within bore 123 of the stationary clamping plate 13. Thereafter injection plunger 90 is propagated downwards the same way as described above, enters the upper space of cylinder 139 and injects the plasticized material contained therein through nozzle 140.

New material can be fed into cylinder 139 by an individual feeding means of the type and arranged in the same way as hopper 91 shown in Fig. 1; for simplicity's sake those feeding means are omitted in Fig. 12.

It is also possible to arrange a plurality of injection cylinders 139, 139' on a slide 145, as shown in Figs. 13 and 14. The slide is movable on cross bars 146, 147 fixedly mounted on the uprights 11, 12. While one cylinder, e. g. 139, is in alignment with bore 23, the other one, e. g. 139' is moved sidewardly. Thus, it is possible to feed material into cylinder 139' from a hopper 91 through discharging chute 148. Another feeding means 91', 148' can be arranged on the other side, as shown in Figs. 13, 14, containing the same or a different kind of material than hopper 91.

With this arrangement, injection plunger 90 will inject the material filled into cylinder 139 in its position shown in Fig. 13, while new material is fed simultaneously into cylinder 139'. After the cycle is completed, and plunger 90 withdrawn, slide 145 is moved to the right side in the drawing, so that cylinder 139 comes under chute 148' and the filled cylinder 139' under plunger 90. In the next following cycle the material contained in cylinder 139' is injected by plunger 90, while cylinder 139 is filled with a pre-measured quantity of moldable material from hopper 91'.

When plunger 90 is withdrawn from space 126, Figs. 1 and 6, material adhering to its circumference should be stripped off. To this effect a stripping ring can be provided as shown in Figs. 15, 16. The ring is composed of a plurality of sectors 149 contacting with their inner circular surfaces the plunger 90 and being pressed against it by means of a circular compression spring 150. An L-shaped ring 151 is mounted on the upper end of cylinder 73 and covers the spring ring 150 and part of the upper side of sectors 149. Ring 151 is preferably somewhat spaced from the spring and sectors and merely serves to prevent their falling off from cylinder 73.

It should be understood that the supply of oil or like fluid under pressure through the hollow pillars 11, 12, is only a preferred feature of the invention. Instead, any separate tube or conduit can be arranged.

It should also be understood that timed turning or moving of arms 76, 111 and slide 145 can be effected by power means such as described and

shown for turning ring 48 or actuating the toggles.

It should be further understood that timed and preferably adjustable actuation of valves 68, 71 and 107, and of the valves or other means for admitting and releasing fluid under pressure to cylinders 49 and 117 as well as admitting fluid under pressure to channel 136, furthermore intermittent actuation of the power driven means for feeding the powdery moldable material into the spaces 126 and shifting arms 76 and 111, can be effected by automatic control means, such as well known and therefore not shown electrical timing arrangements comprising e.g. one or more preferably exchangeable cams on a motor driven shaft. The speed of the shaft can be adjusted, and each complete revolution of it corresponds to one cycle of the machine. The cam or cams are shaped so that rollers contacting the cam surface are raised or lowered at certain moments and close and open, respectively, circuits for electromagnetic relays or motors which in turn actuate an associate valve or other controlling element, turn an arm 76, move a slide 145, etc.

By adjusting reduction valve 69 the total clamping pressure exerted by the hydraulic pressure means can be regulated so as to meet the requirements of each individual case which improves the efficiency of the invention.

If powdery moldable material is fed into the open end of an injection cylinder after the injection plunger has been completely withdrawn, as illustrated in Figs. 13 and 14, feeding chutes of considerably larger cross section than shown can be used, and it should be understood that also with arrangements as shown in Figs. 1 and 2 and even with a single or stationary injection cylinder this method of feeding fresh material into the open end of an injection cylinder can be applied to advantage.

Instead of passing the heating current through tubes 77 to 79, etc., in Figs. 8, 9, separate heating elements can be associated with the latter, or a coil carrying an alternating and particularly high frequency current arranged around and outside of cylinder 73, to effect induction heating of the latter and the tubes whereby electrical insulations within the cylinder and for leading-in conductors can be dispensed with.

The separate power driven means 57, 58 for reciprocating the hydraulic pressure means 26, 27, operate obviously and advantageously with relatively small power over a long stroke while the hydraulic means operate with relatively great power over a very short stroke of plate 26, and the latter will hardly move at all when pressure is applied to it.

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INJECTION MOLDING PLASTIC MATERIAL
Filed Dec. 21, 1940

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371,188
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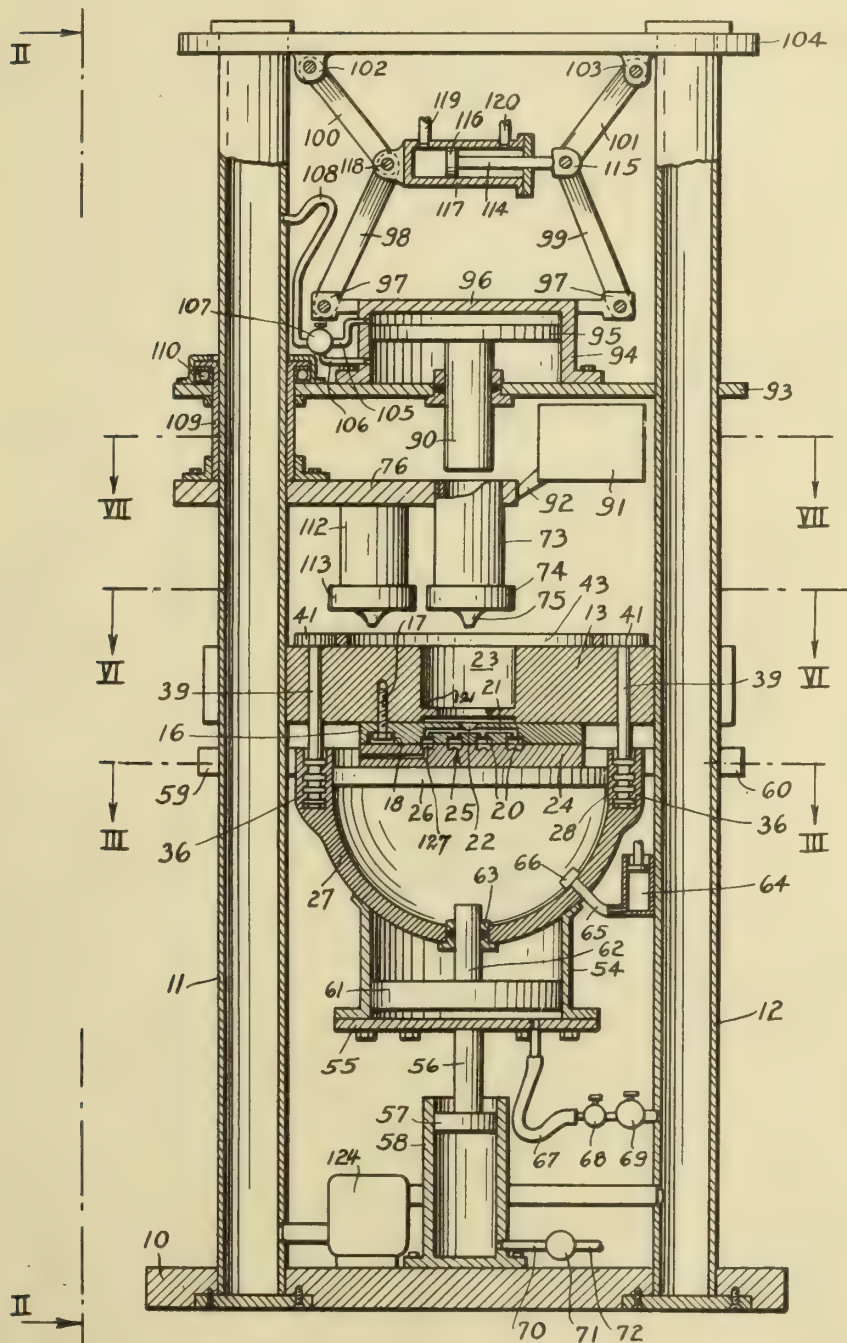


Fig. 1.

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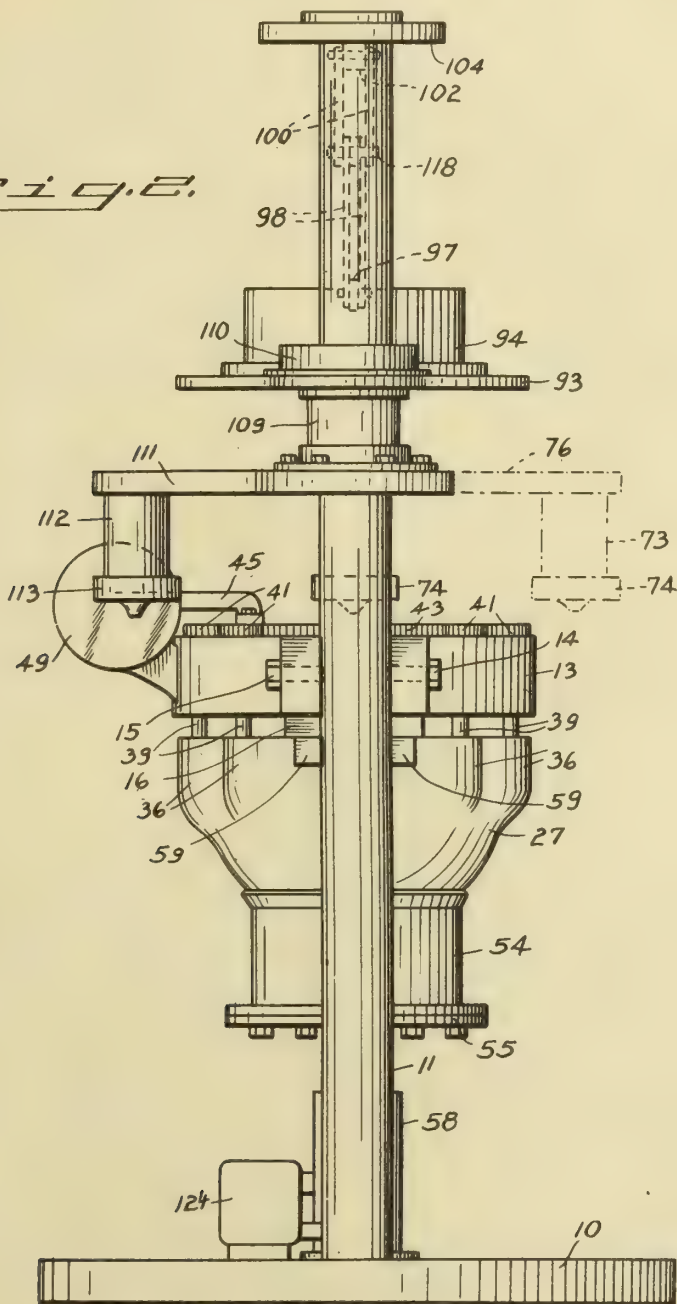
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Fig. 2.



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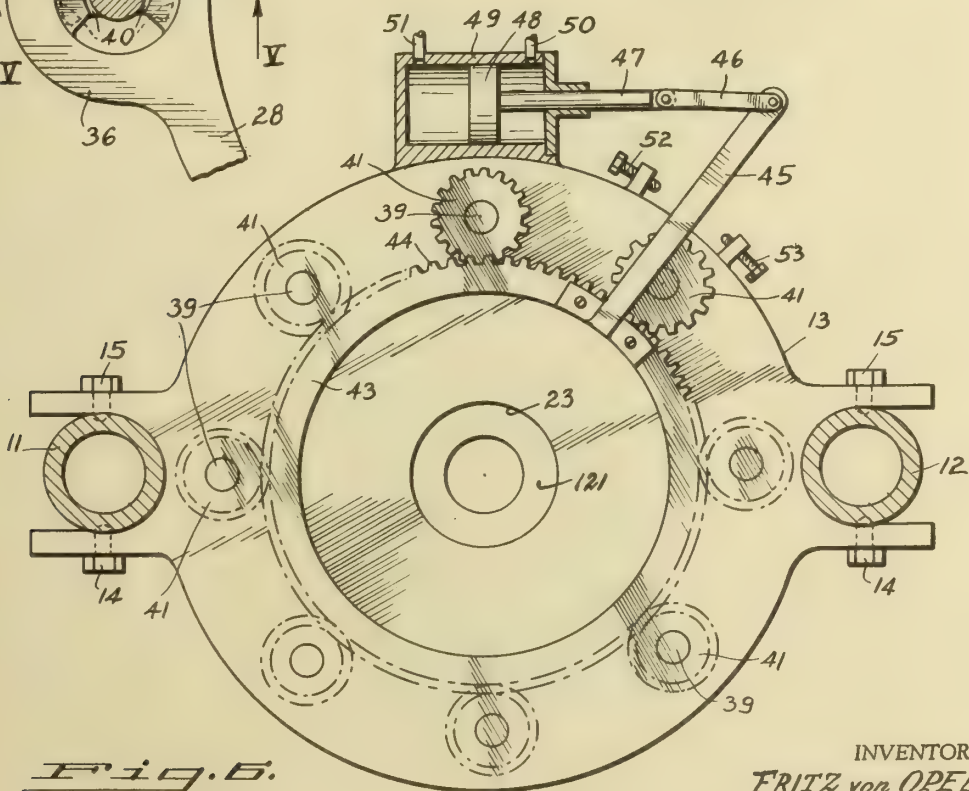
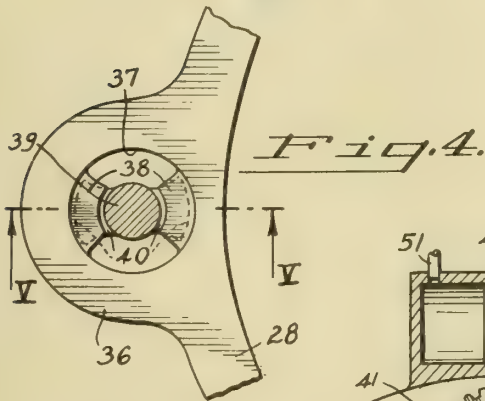
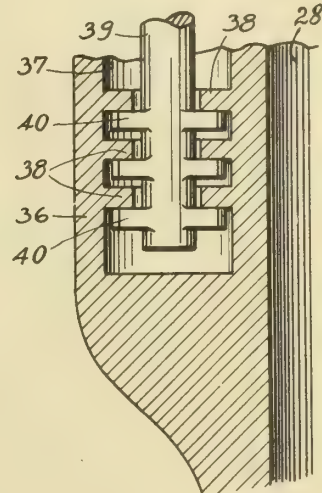
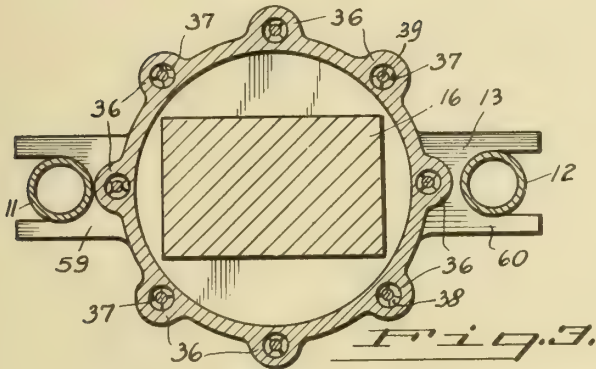
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Fig. 9.

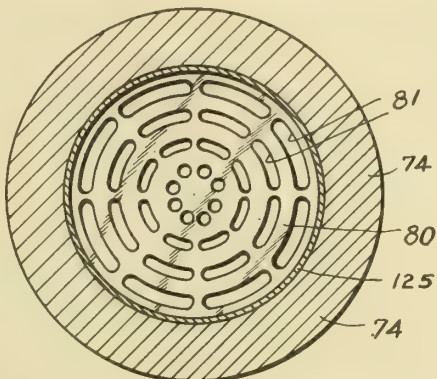
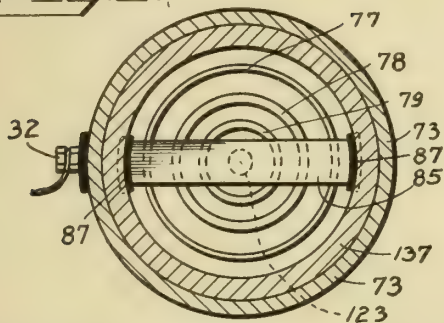


Fig. 10.

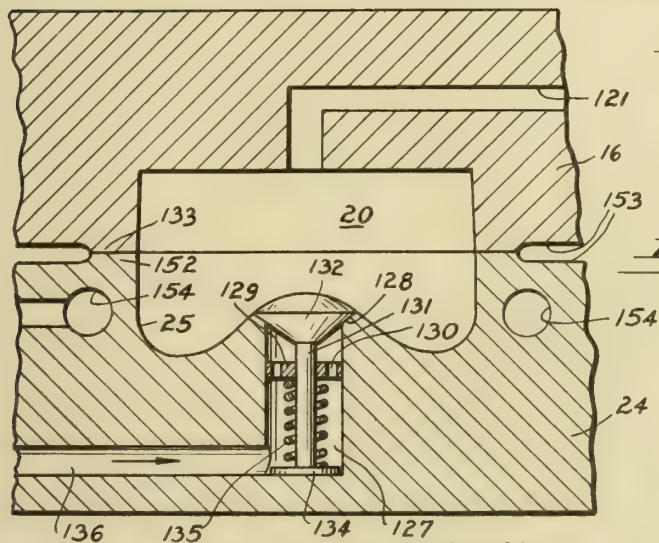


Fig. 11.

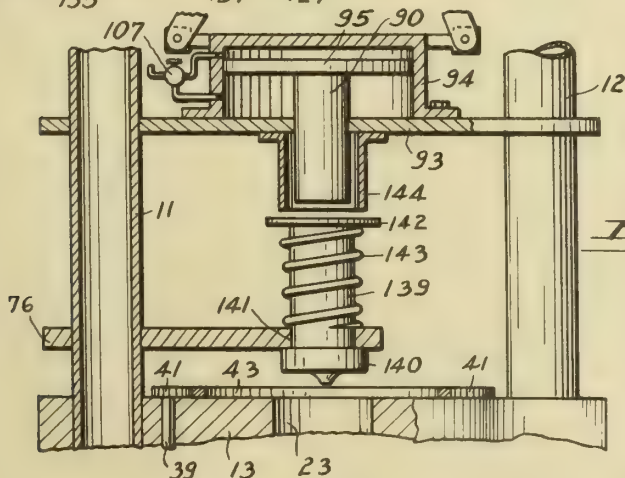


Fig. 12.

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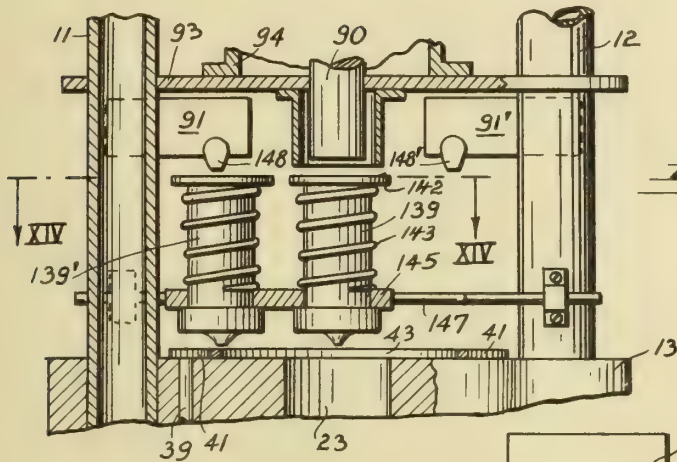


Fig. 13.

Fig. 14.

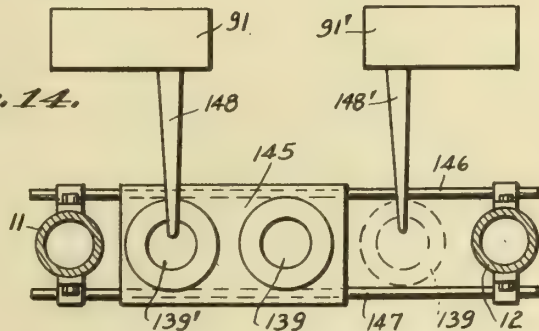
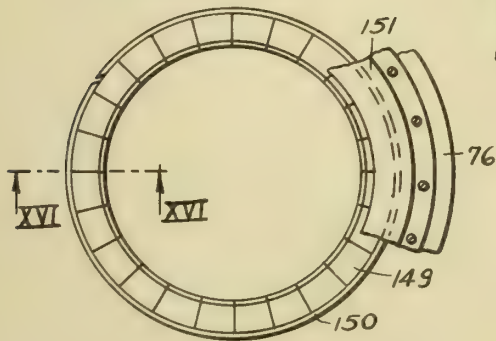


Fig. 15.



ALIEN PROPERTY CUSTODIAN

STRAIGHT-LINE BREECH LOCK FOR
AUTOMATIC FIREARMS

Ernst Altenburger and Karl Schweikle, Obern-
dorf, Germany; vested in the Alien Property
Custodian

Application filed December 26, 1940

The invention relates to a straight-line breech lock for automatic firearms and has the purpose to use the known straight-line breech lock turned out very well in connection with small arms for automatic firearms.

An object of the present invention is the provision of a straight-line breech lock for automatic firearms which is simple in construction and safe and easy in its attendance.

According to the present invention the straight-line breech lock for automatic firearms consists substantially of a breech block guided in the casing of the firearm in a straight-line and of a bolt head or breech head axially guided in the said breech block by means of a steep thread portion and provided with locking lugs for securing the breech head in the sleeve of the barrel and with control members for the purpose of rotating or turning the said breech head in its breech block. These control members may be constructed in the form of cams or rollers which cause in cooperation with guide cams on the breech casing during the recoil movement of the breech a rotational movement or turning of the breech head and thereby an unlocking of the breech from the barrel of the firearm. A detent between the breech head and the breech block, which becomes effective after the unlocking of the breech from the barrel of the firearm and is released shortly before the locking of the said parts renders the steep thread portion between the breech block and the breech head ineffective, so that both parts are rigidly connected together for an axial movement.

The transfer of the impulse to the breech head and the rotational movement or turning thereof is effected in connection with recoil-operated automatic guns by the receding barrel by means of a guide cam or cams on the breech casing against which the cams on the breech head impinge and the throwing or pushing back of the breech block is effected entirely freely and only by means of the steep thread portion on the breech head stem.

A further object of the invention is the provision of means for preventing that differences in the movement of breech block and breech head or blows of force upon one of the said members cause on the way jointly covered by the breech block and the breech head after the unlocking thereof a rotational movement or turning of the said parts on account of the provided thread guides. On this common way breech head and breech block represent a single part and the locking lugs and the controlling cams preferably

run through the same guide path as the guiding ledges on the breech block. These means may comprise in the preferred embodiment a biased detent lever controlled by a suitable abutment. In the simplest form the thread portions in the breech block may be provided on both sides with stepped or offset parts into which the control or guide members on the breech head stem are adapted to enter.

Forces having the tendency to shove together the two parts of the breech are prevented at this by the said offsetting of the thread portions in the breech block, whereas abutments or stops prevent a further separation of the parts. It is easy and convenient to release such a lock for the reason that it is only necessary to turn back one of the said parts and in the present instance the breech head so far that the thread portions are in alignment with the control or guiding members.

The shoving together both parts of the breech may be assisted by arranging in the breech a spring which is adapted to work against the axial separation of breech head and breech block and whereby the effect is also increased.

A further special advantage of the present invention resides in the fact that in connection with recoil-operated automatic guns with recoiling barrel, the said barrel may immediately slide forward into its fore-position or firing position so that counter-recoil springs or buffer springs may be used with advantage. Further the breech may be easily pulled up by hand by means of a draught member connected to the breech block.

In the preferred embodiment of the present invention the firing pin is rigidly connected to the breech block or breech casing so that in connection with the above explained spring an efficient locking-ignition and a strong and safe locking of the breech may be effected.

Of course, also an independent firing pin may be used which may be brought into its cocking position by twisting or worming out the breech head out of the breech block and which may be released from the said cocking position after locking the parts of the breech by means of a suitable abutment.

The invention consists in the novel construction and arrangement of parts to attain the ends above specified and in the details of construction and mechanism for other purposes, as will hereinafter more fully appear and which are defined in the claims forming part of this specification.

In the accompanying drawings, wherein cor-

responding parts are represented by like characters in the various views.

Fig. 1 is a side elevation of the breech with a part broken away for the purpose of clearer illustration.

Fig. 1a is a front elevation.

Fig. 2 is a side elevation of the parts shown in Fig. 1 in another position.

Fig. 3 illustrates in a side elevation a modification.

Figs. 4, 4a and 4b illustrate in a side elevation and in a face view, respectively another modification.

Fig. 5 is a fragmentary detail view of the breech block showing a further modification, and

Fig. 6 illustrates in a fragmentary view a recoil-operated automatic gun.

The breech lock made in two parts is movably guided in the usual manner in a longitudinal direction in the casing of the firearm and the counter-recoil spring which is tensioned during the recoil of the breech lock acts upon that end of the said breech lock which is opposite to the bottom of the cartridge. Before firing the breech head of the breech lock is locked with the barrel of the firearm.

The breech lock comprises the breech block or casing 6 and the bolt head or breech head 3 provided with one or more locking lugs 1 and cams 2 on its periphery and further with a stem-like extension or breech head stem 4. This stem-like extension 4 of the breech head 3 is guided by means of a steep thread portion 5 in a corresponding thread groove formed in the axial bore of the breech block 6. As shown especially in Fig. 1a the breech block 6 is further provided with guiding ribs or ledges 7 adapted to slide in corresponding grooves 8 of the arm casing so that a movement of the breech block 6 in a straight-line is ensured. In the preferred embodiment of the present invention the screw thread on the breech head stem is formed in the shape of a cam or thread cam 9.

The locking lugs 1 are adapted to rigidly connect in the usual manner the breech head 3 of the breech lock to the barrel 10 of the arm provided with a sleeve 10a having a transverse groove 1a and longitudinal releasing groove 1b as shown in Fig. 1 of the drawings. If the breech head 3 is inserted into the sleeve 10a of the barrel it is partially rotated or turned, whereby the locking lugs 1 resting in the transverse groove 1a of the sleeve 10a prevent a movement of the said breech head in an axial direction.

For the purpose of opening the breech lock and unlocking the breech head 3 from the sleeve 10a of the barrel a member moved by the recoil impulse and provided with one or more guide cams 11 is acting upon the cams 2 of the breech head in such a sense that by the cooperation of the said guide cams 11 and cams 2 a rotational movement or turning of the said breech head is enforced, whereby the locking lugs 1 of the breech head are turned round and brought into alignment with the releasing groove 1b of the barrel sleeve.

This rotational movement or turning of the breech head 3 results, however, a longitudinal movement of the breech block 6 on account of the engagement of the breech head stem 4 with its steep thread portion 5 in the thread groove of the axial bore in the breech block 6, so that the breech block 6 will carry away the breech head 3 in the longitudinal direction as soon as the lock-

ing lugs lie in the releasing grooves 16 of the barrel sleeve.

The above indicated member moved by the recoil impulse and adapted to effect a rotational movement or turning of the breech head 3 may be either a part moved by the gas-plunger as in a gas-operated rifle or it may be as in the present embodiment for a recoil-operated automatic gun the breech head itself carried away by the recoiled barrel. In this event the guide cam 11 is stationarily arranged on the casing of the arm. As shown in Figs. 1 and 2 a detent lever 12 is provided for locking the breech head 3 with the breech block 6 as soon as the said parts are unlocked. This detent lever 12 pivotally mounted in the breech block 6 and biased by a spring 13 is adapted to enter with its one end into a recess or groove 14 in the breech head stem 4. If the breech locked in this manner slides forward again the detent lever 12 runs over an abutment 14' and is automatically released by the said abutment in the final position of the breech head 3, so that the crowding breech block 6 by means of the steep thread portion effects a rotational movement and locking of the breech head 3.

The striker or firing pin 15 is rigidly connected to the breech block 6 by means of a stud 16 as shown in Fig. 1 of the drawings. A supporting disk 17 is fixed on the said firing pin 15 and a spiral spring 18 bearing upon the said disk with one end rests with its other end upon a cover plate 19 on the breech head stem 4. This spiral spring 18 is working against a separation of the breech head 3 from the breech block 6 and results a powerful and reinforced locking and ignition.

The cam or cams 2 shown in Figs. 1 and 2 of the drawing may be replaced by a roller 20 as indicated in Fig. 3 and for the purpose of controlling the two parts of the breech during the locking and unlocking operation there is cut into the envelope of the breech block a front thread portion 21 as shown in Fig. 3 of the drawings, with which cooperates an operatively acting cam 3' on the breech head. For the inner thread 5' of the breech block with which cooperates a thread cam 9 on the breech head stem there is provided a back lash or play 22 between the said thread cam 9 and the inner thread 5' only limiting the turning out of the breech head whereby a simple type of lock is obtained which replaces the detent lever shown in Figs. 1 and 2 of the drawings. In this case after unlocking the parts the two thread portions are displaced about a further rotational movement or turning of the breech head corresponding to the above mentioned back lash or play 22. This type of lock is released by the fact that during the run out of the breech to the firing position the roller 20 runs upon a starting cam path 23 on the sleeve 24 of the barrel whereby a rotational movement or turning of the breech head 3 is effected as shown in Fig. 4a of the drawings. As soon as the roller 30 glides off from the front face 25' of the guiding rib 7 (see Fig. 4) and arrives at the inclined face 25 of the said rib the breech block 6 and the breech head 3 are adapted to shove together.

As shown in Fig. 4b of the drawings the controlling member is constructed in two parts 20, 30, the upper part 20 of which is adapted to cooperate with the guide cam 11 and with the starting cam path 23, whereas the lower part 30 is adapted to slide on the inclined face 25 at the end of the guiding ledge 7. In this event the said

inclined face 25 replaces the above mentioned front thread portion.

A further modification of the lock is shown in an example in Fig. 5 of the drawing.

In this modification the steep thread portion 5 on the breech block terminates into an offset part 5'' extending transversely to the longitudinal axis of the breech block 6. At the end of the unlocking movement the thread cam 9 on the stem of the breech head enters into the said offset part 5'', whereby the breech head 3 and the breech block 6 are locked together. Both parts of the breech are, therefore, prevented against turning during the backward movement by the fact that the rollers 30, the diameter of which being substantially the same as the width of the guiding grooves 8' of the casing of the firearm, enters into the said grooves.

In the embodiment of Fig. 6 a recoil-operated automatic gun is shown the barrel 26 of which is movably mounted. A counter-recoil spring 27 is adapted to immediately recuperate the barrel into the firing position. The breech block 6 is axially movable in the casing 8 of the automatic gun and a second counter-recoil spring 28 is adapted to act upon the said breech block. This breech block 6 may be caught and released for the shot by the firing lever 29. The rotational movement or turning of the breech head 3 for the unlocking is effected in this case by the guide cam 11 arranged in the casing of the automatic gun. The firing pin (not shown) is rigidly connected to the breech block.

The operation of the straight-line breech lock for automatic firearms according to Figs. 1 and 2 of the drawings is the following:

Immediately after the shot the barrel 26 and the breech head 3 locked with the said barrel and also the breech block 6 carry out jointly a short backward movement. At the end of this backward movement the cams 2 on the breech head 3 impinge upon the guide cams 11 on the stationary casing of the firearm and slide along the said guide cams. Therefore, the breech head 3 receives a rotational movement or turning and the locking lugs 1 on the said breech head are got out by turning from the grooves 1a and enter into the releasing grooves 1b. At the same time with this turning of the breech head the breech block 6 receives an impulse by means of the steep thread portion 5 and the thread cam 9 on the breech head stem, which throws backwardly the breech block with acceleration away from the breech head. In this movement the ribs or ledges 7 on the breech block slide in the grooves of the casing of the firearm. Hereby, the breech head 3 is pulled back with a high force by the breech block and withdrawn from the barrel which returns again by the action of its spring 27 (see Fig. 5) into its initial position. This peculiar kind of motion is highly important for the safe functioning of the firearm for the reason that the cartridge case is already loosened from the beginning of the unlocking rotation or turning of the breech head and thereupon wholly extracted by means of the rapidly receding breech block. Therefore, the extraction of the cartridge case is effected rapidly and safely.

As soon as the unlocking is obtained the detent lever 12 snaps into its groove or recess 14 (see Fig. 2) under the action of its spring 13, whereby the breech head 3 is connected to the breech block 6 and prevented against a rotation or turning. Both parts i. e. breech block and breech head jointly execute their backward movement up

to their final position and are then led forward by the locking spring. If the breech runs over the abutment 14' the detent lever is brought out of engagement from its groove or recess 14 and the locking lugs 1 enter again into the releasing grooves 1b of the barrel-sleeve, whereupon the breech head 3 is rotated by means of the steep thread portion 5 and the thread cam 9 under the action of the crowding breech block 6 and locked in the grooves 1a of the barrel-sleeve. At the end of this movement the firing pin 15 strikes upon the percussion cap of the cartridge (not shown) and the above described cycle of movements is repeated.

In the modification shown in Fig. 3 of the drawing the mode of operation is substantially the same. As above explained in this modification the steep thread portion on the breech block is divided into two parts, viz. a front thread portion 21 and an inner thread portion 5' which latter forming the geometric continuation of the first named front thread portion. Therefore, during the unlocking movement the prevailing portion of the impulse is transferred by means of the operatively acting cams 3' on the breech head and the cam faces or front thread portions 21 in the envelope of the breech block, whereas the inner thread portion 5' substantially performs only a controlling function limiting the screwing movement of the breech head.

The lock between the breech head and the breech block is effected in the two embodiments shown in Figs. 3 and 4 in a simple and convenient manner and without the use of separate movable members by the fact that the thread cam 9 on the breech head stem has a play or back lash in its inner thread portion 5'. At the end of the unlocking movement the breech head is, therefore, in the position to execute a relative rotational movement or turning without any longitudinal shifting with respect to the breech block 6, until the said thread cam 9 has moved so far with respect to the breech block that it engages the opposite side or flank of the inner thread portion 5' as shown in Fig. 4 of the drawings. The roller 30 has moved in the meantime before the front face 25' of the guiding ledge and simultaneously enters into the groove 8' of the casing 8 of the firearm. As the diameter of the roller 30 is substantially the same as the width of the said groove 8' the breech head cannot turn further with respect to the breech block and both parts of the breech are locked with the same result as in the example of Figs. 1 and 2. In the locking movement of the breech the roller 30 comes out of the groove 8' and impinges upon the starting cam face 23, whereby the rotational movement or turning of the breech head is initiated. The roller 30 glides off from the front face 25' of the guiding ledge 7, whereby the lock between the breech head and the breech block is released so that the said roller can arrive at the inclined face 25 of the ledge. The locking movement proper of the breech can now take place in the manner as above described in connection with Figs. 1 and 2.

As will be seen from the above description in connection with the accompanying drawing the straight-line breech lock according to the present invention is simple in its construction and ensures at reliable operation a high velocity of firing and a long duration of life.

The arrangement of all highly strained parts on the breech head gives rise a rigid and compact structure with the least expense of material

and room. In firing or discharging the firearm the breech head exposed to the firing impulse is directly operated and simultaneously by the rotation of the said breech head a throwing or pushing back of the relative heavy breech block and the entire breech is initiated and accomplished.

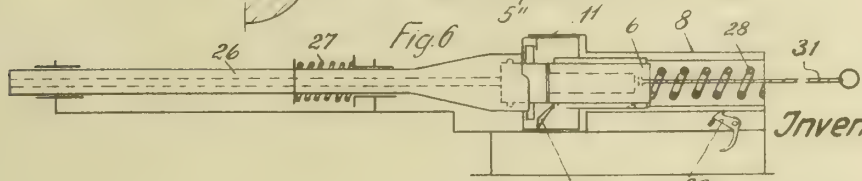
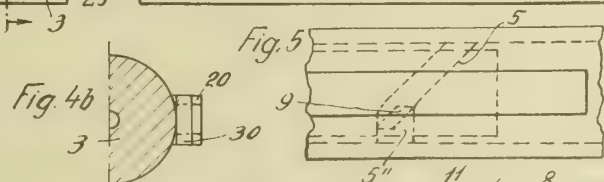
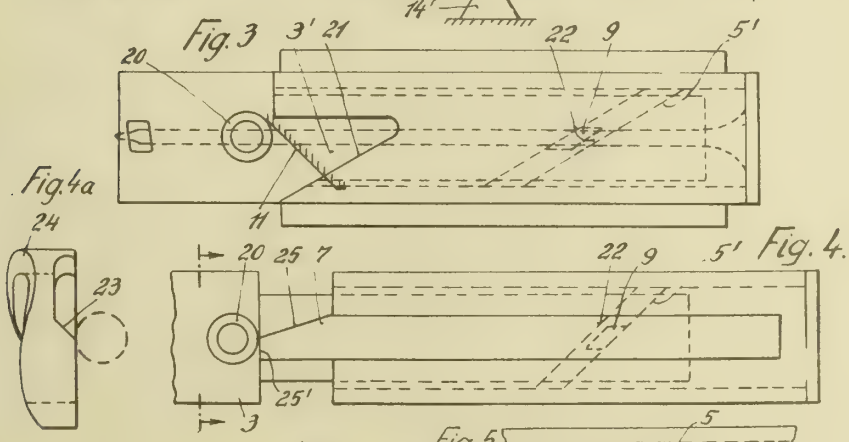
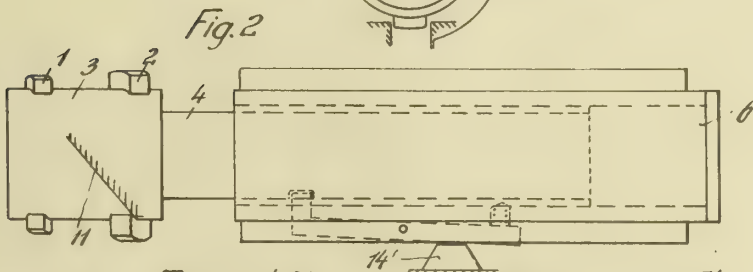
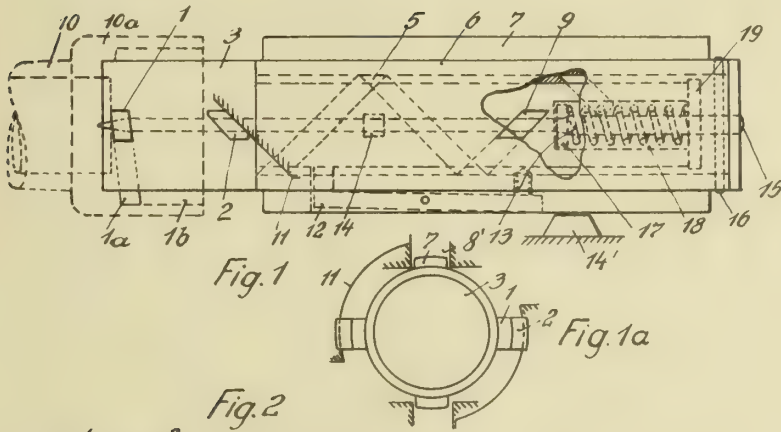
It will be further understood that I do not limit myself to the details of construction above set forth, but, on the contrary, that many modifications may be made within the broad scope of my invention.

;
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KARL SCHWEIKLE.

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